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CLINICAL CASES IN WHICH VERTIGO IS A CARDINAL SYMPTOM

JOHN B. McMURRAY, M.D.

WASHINGTON, PA.

The vestibular reflex arc contains at least seven neurons and probably many others not yet recognized. The involvement of any one of them may produce vertigo. The lesion may be in the nuclei in either the afferent or the efferent pathway, and the type of vertigo may vary with the location of the lesion. The nearer the lesion to the labyrinth, the nearer the vertigo approaches the true labyrinthine type.

Vertigo is described by the patient as giddiness, dizziness, swimming in the head, staggering or unsteadiness in motion. Many patients with some or all of these symptoms on careful analysis of their complaints will be found to have been describing the dizziness that accompanies an acute gastro-intestinal upset, the weakness resulting from an acute illness or a prolonged chronic suppuration or a long list of possible sensations that do not conform to the type of vertigo under consideration. Disturbances of the cerebral circulation, such as those in cases of arterial hypertension, chronic myocarditis, heart block, valvular lesions of the heart and the anemias, may be the cause of dizziness that is usually produced or aggravated by sudden movements, such as stooping or rising quickly from a sitting or lying position. Dizziness is not uncommon in neuropathic conditions. The confusion caused by palsy or imbalance of the ocular muscles is common, but it is relieved by the occlusion of one eye. True labyrinthine vertigo is sudden in its onset. The duration may vary from a few hours to days. The interval between attacks may be days, weeks or months. Between attacks the patient may be entirely free from any feeling of unsteadiness, or he may complain of a sense of insecurity when walking or on any sudden change of position or direction of movements.

A patient gave the following history, which describes a typical attack of labyrinthine vertigo:

> In April 1933, while suffering from rather severe sore throat, I experienced an attack of vertigo. The attack first came on during the night while I was turning to the left side. I had a feeling of the head filling, and then objects seemed to move in a lateral ovoid. These symptoms passed off in a few minutes,

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but they recurred later in the night as I turned back to the right side. For the next several days the symptoms would recur with the slightest motion of the bed or the body, and frequently while I was lying perfectly quiet there would occur first the sense of the head filling and then that of the movement of all objects in the lateral ovoid, the range of objects across the room being probably from 2 to 3 feet. Accompanying this was intense nausea, but no vomiting. These major symptoms quieted after four or five days, and I was able to return to the office. A sense of the head swimming and of insecurity, something like that on the first day off a boat, persisted for several days longer. For several days after that I was sensitive to motion and was nauseated while riding in a car. During the next two months I was free from symptoms and was able to play tennis and enjoy the regular activities of life.

In the selection of the cases for study it was found that they had the following characteristics in common: 1. There was definite objective or subjective vertigo. All the cases were classified as instances of subjective vertigo in which the patient could not definitely state that objects within the field of vision seemed to move in a specific direction. Several patients could state the direction of the movement, but many,

TABLE 1.—*Distribution of Cases According to the Duration of Symptoms*

Duration	No.	Duration, Years	No.
1–12 mo.	86	7– 8	4
1–2 yrs.	48	8– 9	1
2–3 yrs.	17	9–10	1
3–4 yrs.	11	10–11	1
4–5 yrs.	7	15	4
5–6 yrs.	1	17	1
6–7 yrs.	1	18	1

while they were conscious of the sensation that objects were moving, were not able to designate the direction. 2. The attacks were intermittent. The duration of the symptoms varied from a few months to fifteen years.

In the 86 cases in which the patient complained of vertigo of less than one year's duration, the diagnosis of acute toxic labyrinthitis seems to have been justified on account of the large number of recoveries following the removal of a suspected focus of infection. In this group in which the duration of symptoms was comparatively short, were cases in which there was a history of trauma of the brain resulting from an automobile accident. Instances of hypothyroidism occurred frequently in this group. There were 2 cases of obstruction of the eustachian tube, the vertigo being relieved immediately after inflation. Dental abscess was the most common single focus found. Chronically infected tonsils were second in frequency in cases of what might be termed acute labyrinthine disturbance. Hyperthyroidism and cardiovascular disease were assigned as the exciting causes in a few cases. Nicotine was the excitant in 3 cases, as recovery was prompt when the use of tobacco was stopped.

True labyrinthine vertigo does not seem to attack young persons. Only 3 cases in a total of 184 occurred in persons under 20. The decades in which the frequency is greatest are those between the ages of 35 and 55. This is probably accounted for by the fact that during this period the ravages of many preexisting infections commence to show their deleterious effect on the neurocirculatory system.

Tinnitus was a common symptom. Although of the 184 patients 125 did not have tinnitus, they stated that they had it at times during the attacks of vertigo. If at the time of the examination they were not suffering from tinnitus, they were classified as being free from this symptom.

Forty-four per cent of the patients had normal hearing. Eighty per cent of those with normal hearing did not have constant tinnitus. A

TABLE 2.—*Relation of Vertigo and Tinnitus to Pathologic Conditions of the Ear*

	Normal Hearing	Bilateral Nerve Deafness	Unilateral Nerve Deafness	Normal Labyrinth	Bilateral Labyrinthine Hyperactivity	Unilateral Labyrinthine Hypersensitivity	Bilateral Labyrinthine Hypoactivity	Labyrinth Dead	Chronic Suppurative Otitis Media	Otosclerosis
Objective vertigo with bilateral tinnitus	8	11	2	8	12	1	2	6	3	2
Objective vertigo with unilateral tinnitus	2	6	4	3	7	0	3	4	0	0
Subjective vertigo with bilateral tinnitus	5	3	0	2	4	1	1	0	0	1
Subjective vertigo with unilateral tinnitus	1	3	1	2	3	0	1	0	0	0
Subjective vertigo without tinnitus	24	22	5	9	32	1	2	8	0	2
Objective vertigo without tinnitus	41	29	6	12	40	5	8	8	0	0

group of 20 per cent, therefore, had constant tinnitus and normal hearing. Forty per cent had bilateral nerve deafness. A definite loss of perception for the upper tones was considered to be sufficient for classifying patients as having nerve deafness. Sixty-nine per cent of the patients with bilateral nerve deafness had no tinnitus. Ten per cent had unilateral nerve deafness. The status of cochlear function is no index to vestibular dysfunction.

Twenty per cent showed normal labyrinthine reactions. Fifty-three per cent had bilateral labyrinthine hypersensitivity. Five per cent had unilateral labyrinthine hypersensitivity; 10 per cent, labyrinthine hyposensitivity and 14 per cent had one dead labyrinth. The labyrinthine reactions were tested by the caloric method, water at a temperature of 68 F. being used. Reactions that appeared in less than fifty seconds were considered to indicate hypersensitivity. Many patients were tested several times, and all by the same method, so that the results were considered reliable.

In the tests of labyrinthine function, as in those of the cochlear function, many normal reactions were obtained. In the cases in which the labyrinths were hypersensitive, it could not be determined whether the hypersensitiveness was the normal condition of the patient and toxemia the cause of the vertiginous attacks or whether, on the other hand, toxemia was the cause of the hypersensitiveness of the labyrinth. My opinion is that hypersensitiveness of the labyrinth per se is not necessarily a pathologic condition. Chronic suppurative otitis media was not a factor in this group of cases. Neither was otosclerosis. During the general examination of these patients, certain definite foci of infection were found. Chronically infected tonsils, infected teeth, chronic prostatitis and chronic constipation were the most common conditions. Many patients definitely stated that the vertiginous attacks were associated with certain gastro-intestinal disturbances. If these disturbances are so closely associated with vertiginous attacks, other chronic disorders may also be definite etiologic factors.

The diagnosis of toxic labyrinthitis was made in 104 cases. The conditions found and assigned as probable causes are listed in the following tabulation:

	No. of Cases
Chronically infected tonsils	61
Syphilis	5
Infected teeth	36
Duodenal ulcer	5
Cholecystitis	3
Gingivitis	1
Chronic prostatitis	12
Chronic constipation	22
Spasm of the pylorus	1
Rectal abscess	2
Bilateral sinusitis	1
Encephalitis	1
Chronic arthritis	3
Chronic appendicitis	2
Maxillary sinusitis	5
Sphenoid sinusitis	2

In 44 cases the following diseases of the central nervous system were noted:

	No. of Cases
Diffuse encephalomyelitis	1
Cerebellar tumor	11
Traumatism	3
Psychoneurosis	4
Ménière's disease	11
Early parkinson's disease	2
Neurocirculatory asthenia	1
Neurofibromatosis	1
Acoustic tumor	11

In 11 cases the clinical features conformed to those of the typical Ménière symptom complex, i. e., violent attacks of vertigo, deafness or impairment of the cochlear function on one side or on both and persistent tinnitus, unilateral or bilateral but more marked on the side on which there was the greater reduction in hearing. These cases would indicate that the lesion was either in the labyrinth or in the vestibular branch of the eighth nerve. Eight patients were treated by section of the vestibular branch of the eighth nerve and were entirely relieved of vertigo. In 3 cases the vertigo persisted. In 1 of the 3 instances there was improvement after section of the nerve, but the patient lost the cochlear function, whereas before the operation he had practically normal hearing. The more difficult it is to determine whether the right or the left side is at fault, the more doubtful the benefit which the patient is likely to derive from section of the vestibular branch of the eighth nerve. This is in complete accord with Furstenberg's conclusion that "obviously a nuclear lesion under such conditions would not be affected by section of the auditory nerve and herein may lie an explanation for the failure in rare instances to obtain immediate and complete relief following severance of the acoustic nerve."

The eradication of definite foci of infection has been beneficial in some cases of the most severe vertigo. The most striking instances were those of complete disappearance of the vertiginous attacks after the treatment of chronic prostatitis and in one case after operative treatment of a rectal abscess. The diet advocated by Furstenberg and ammonium chloride gave relief in 4 cases, but I have found that ammonium chloride is not always well tolerated. This method of treatment in the cases in which it has so far been employed has yielded so much better results than any other as yet tried that I attribute the less brilliant results in my hands to the lack of the master-touch than to a fault in the method.

SUMMARY

Vertigo is not an otologic problem, except when it occurs as a complication in cases of acute or chronic suppurative otitis media. The aurist can be of aid in determining the cause of the vertigo, but not more than the ophthalmologist. In many cases of intermittent vertigo of a severe type the hearing and labyrinths are normal so far as can be determined by the present methods of examination. It is possible that the lesion is located somewhere along the labyrinthine pathway, on the way either to or from the cerebral cortex. Whether the exciting cause is a disturbance of water metabolism, as suggested by Kopetzky and Dederding, the sensitivity of the nucleus, vestibular nerve or labyrinth itself to sodium, as suggested by Furstenberg, Lashmet and Lathrop, or to toxins from a distant focus, or protein sensitization cannot at

present be determined. All patients with true vertigo should be thoroughly examined and all possible foci of infection eliminated, as there is sufficient evidence to warrant the conclusion that infection may be the etiologic factor. In cases of Ménière's symptom complex, if the side of the offending lesion cannot be definitely determined, section of the vestibular nerve does not promise brilliant results.

The study of the cases forming the basis of this analysis was made at the suggestion of the late Dr. William V. Mullin of the Cleveland Clinic. The greater portion of the material was obtained by analysis of histories of cases from the otolaryngologic department of the Cleveland Clinic.

ABSTRACT OF DISCUSSION

Dr. K. A. MacKenzie, Halifax, Nova Scotia: Vertigo is due to many disorders other than those of the labyrinth, for instance, seasickness, poisoning from tobacco and alcohol, migraine and cerebral lesions, in all of which the mechanism is different. In many cases of injury of the head, fracture, etc., the patient suffers from attacks of recurring vertigo, and the lesion is far from the labyrinthine mechanism. It is difficult to determine with certainty where the defect is in a given case. Focal infection frequently is the cause; often it is not. Dr. McMurray's facts are of great value. They admit of more than one interpretation. I cannot share his confidence that in all the 86 cases the condition was due to toxic labyrinthitis. If he had said toxic labyrinthine disturbance, the application would be broader. Surely, in some cases the condition was due to other causes than focal infection. In fact, he admits that obstruction of the eustachian tube and nicotine were factors in several cases in which there was obviously no inflammation. He also mentions cardiovascular defects. There is much evidence that in some cases vertigo is due to a lesion of the brain. One often sees hemiplegia with dizziness persisting for a considerable time. I recall a case of vertigo with quadrantic hemianopia in which the lesion was in the occipital lobe and the patient recovered without tonsillectomy. I often see severe and recurring vertigo of sudden onset in patients with arteriosclerosis, suggesting a vascular lesion. Where? In the labyrinth, the cerebellum, the nuclear area or some other part of the brain? In many of these cases vertigo is not labyrinthine nor can it be attributed to focal infection. The case for focal infection is not proved, and much work has to be done. Recovery after tonsillectomy is only presumptive evidence of the nature of the cure, and many patients recover without tonsillectomy. The principle of removal of focal infection is sound, but the value of tonsillectomy as a means of cure is a bit overstated. The main point that I should like to make is that in many cases, perhaps in some of Dr. McMurray's, vertigo is due not to disorder of the labyrinth but to lesions elsewhere.

Dr. D. E. S. Wishart, Toronto, Canada: My conception of true labyrinthine vertigo is different from that of Dr. McMurray. Any of my hearers who will submit to the cold caloric test while recumbent will notice important dissimilarities. True labyrinthine vertigo can be produced by douching the ear with water at a temperature of 62 F. Four reactions follow: (1) Nystagmus of a definite type, amplitude and speed occurs; (2) the patient becomes dizzy; (3) if the patient is asked to touch an object with his finger, he misses the object and is said to "past point," and (4) if the douching is continued the patient will vomit. Every consultant should undergo this experiment and thus form an exact concept of true labyrinthine vertigo. The practitioner must never forget that the responses

to stimulation of the labyrinth of the ear during the static condition are among the most constant of neurologic phenomena. When the symptoms and signs conform to those of severe excitation of one labyrinth, section of the vestibular portion of the eighth nerve is justifiable. If the patient quoted by Dr. McMurray has undergone this operation, I hazard the guess that he has not been cured. The assumption is likely to be made from Dr. McMurray's paper that a focus of infection is the chief thing to be looked for. I submit the statement that, while vertigo arising from toxemia is common, the diagnosis of focal infection should not be made until certain other causes of vertigo have been eliminated as far as possible. True vertigo on turning occurs in cases of: (1) unilateral inefficiency of the eustachian tube, (2) toxemia arising from any organ or part of the body, (3) disorder of the intracranial pathways of the auditory mechanism, (4) lesions of the ear itself and (5) concussion. This enumeration shows that the help of the otologist is essential in the diagnosis of four of the possible causes. My concept is that true labyrinthine vertigo can occur in case of blockage of one eustachian tube. Inflation cures this condition. In addition, there is the large group of patients who have otitis media. Vertigo is the initial symptom in cases of irritation due to caries of the labyrinth. In the presence of otitis media, no physician other than a specialist in diseases of the ear can eliminate the condition of the ear as the cause of vertigo. The ear must be considered first in every case of dizziness. Every case of true vertigo on turning is primarily a problem for the otologist.

Dr. H. R. Slack Jr., Baltimore: I shall comment briefly on the last group of cases to which Dr. McMurray referred in his summary—those falling under the classification of Ménière's symptom complex. Patients with this condition are increasingly incapacitated by the severity of the vertigo and the fear of recurrent attacks. Probably in no other group mentioned are uncertainty and terror such persistent factors. It has been my privilege to have access to the records in the otologic laboratory at the Johns Hopkins University School of Medicine, in which 40 cases have been carefully studied. All the patients underwent section of the eighth nerve by Dr. Dandy, with relief from symptoms. The average age for these patients was 48. Thirty-six had unilateral impairment of hearing of the inner ear type. In 38 of the 40 cases the onset of deafness was gradual, involving perception of both high and low tones, but in no case was there total deafness. Tinnitus was present in every case, and in all but 1 it was referred to the side on which hearing was impaired. All these patients had had several examinations in various places, and all the possible foci of infection had been eliminated. These 40 patients comprise only the group selected for operation. The relief obtained by section of the nerve is strikingly like the results of injection into or division of the fifth nerve in cases of trigeminal neuralgia. There is no characteristic aural change in this condition. Only 10 per cent of the patients gave a history of ever having experienced a disturbance of the ear of any sort. Otoscopic examination reveals no pathologic changes in the middle ear. The audiometer is of no use for diagnostic purposes unless supplemented by careful tuning fork tests. In this group, especially when the deafness is predominantly unilateral, it is of the utmost importance to mask the other ear completely. Time does not permit me to compare the cases of tumor of the cerebellopontile angle with those of Ménière's syndrome, but it is interesting to note that the incidence in the group of 200 cases is the same.

Dr. George Shambaugh Jr., Chicago: While in most cases vertigo of labyrinthine origin is not due to focal infection, recovery appears to follow the removal of foci in a small group of cases. The problem is to determine these cases. The

otologist is hampered in his solution of this problem by the fact that he cannot look into the labyrinth. He has to act on circumstantial evidence. I have been able to isolate a definite group of cases in which the disease appears to be due to focal infection and which are characterized by a group of symptoms consisting of nerve deafness for low tones, diplacusis and vertigo. These patients show deafness, usually of one ear but sometimes bilateral. They show a typical labyrinthine type of vertigo, nausea, ataxia and usually tinnitus, and examination with tuning forks demonstrates nerve deafness for low tones, so that they may not be able to hear the C-32 or the C-64 fork. Yet it is nerve deafness, not conduction deafness. Examination shows definite diplacusis. The fork is usually heard as higher in the defective ear than in the normal ear. This syndrome appears to me to be due to definite exudative labyrinthitis, the vibrating membrane being weighted down by an inflammatory exudate, thus producing diplacusis. In no other way can diplacusis be produced, except by a lesion in the labyrinth. A lesion of the nerve may produce loss of hearing, but it cannot alter the quality of the tone. This group of cases of exudative labyrinthitis, it is believed, are roughly comparable to those of iritis—the result of focal infection elsewhere in the body. If the focus can be removed, vertigo and diplacusis disappear, and the hearing returns to normal. I have seen perhaps half a dozen cases of this syndrome in the past two years, to the removal of which the patient has consented, and when there have been definite, infective foci the lesion usually cleared up promptly.

Dr. John B. McMurray, Washington, Pa.: Dr. MacKenzie referred to the 86 cases of acute disease. I analyzed the histories and tried to determine all the factors that might contribute to the etiology of vertigo. During the general examination all probable foci of infection were noted. Not all these foci were treated. Few tonsils were removed, and not all the infected teeth were extracted. A great many foci cleared up without treatment. Many patients never came back. Many would not even answer follow-up letters. With reference to the suggestion of Dr. Wishart regarding the patient I quoted, I wish to state that this patient was operated on, and, just as Dr. Wishart predicted, he obtained no relief. He was so miserable, however, that he welcomed anything that gave any promise of relief.

FACIAL PARALYSIS

OLIVER P. BOURBON, M.D.
LOS ANGELES

Facial paralysis of any type is of special interest to the otologist. Sometimes it is a complication of otitis media; sometimes it is a post-operative condition following an operation on the mastoid, and sometimes there are symptoms which point to the ear as a causative factor when no aural involvement is present and the functional recovery of the facial nerve relieves the ear symptoms. So that no actual involvement of the ears may be overlooked and so that the ear may be eliminated as a possible cause when there is only an apparent involvement, an examination of the ears should be made by an otologist in every case. All forms of facial paralysis, therefore, come into the field of the otologist as well as into that of the physician who does general practice or of the internist or the neurologist.

Mentioning only those facts concerning the anatomy of the facial nerve and its related structures that are of importance to the question under consideration, it should be noted that in its course within the pons the facial nerve loops around the nucleus of the abducens nerve. In the greater part of its intracranial course it lies in the petrous portion of the pyramid of the temporal bone, housed in the fallopian aqueduct, a long, winding, bony canal. After its exit from this canal through the stylomastoid foramen the nerve is surrounded by lymphatic structures and divides into two principal branches, an upper and a lower, which usually form an obtuse angle with each other and pass through the parotid gland. The middle branches of the two main branches anastomose, forming the parotid plexus. The two branches radiate from the anterior border of the parotid gland and enter the deep surface of the facial muscles. The nerve is accompanied in its course through the facial canal by the intermediate nerve and by the stylomastoid artery and vein.

The facial canal has different openings for the exit of various structures. Several nerve branches from the geniculate ganglion and a small artery pass through the hiatus fallopii; in the downward part of its course there is first a small branch of the nerve that enervates the stapedius muscle, and a little lower the chorda tympani nerve branches from it and leaves the canal. This branch enters the tympanic cavity and is finally distributed as a gustatory nerve to the side and dorsum of the tongue in its anterior two thirds.

It is also to be noted that in the backward horizontal direction of the canal the nerve is separated from the tympanic cavity by a thin

plate of bone in which there may be, and frequently are, dehiscences; that farther on in its course the nerve lies close to the aditus ad antrum and the mastoid wall of the tympanic cavity; that while the nerve is protected in the main by its bony housing, the different natural openings in the canal, its position in relation to the tympanic cavity, the frequency of dehiscences in the wall between it and this cavity and its proximity to lymphatic and other glandular structures after its exit from the canal expose it at different points to the hazards of infection and disease, and that the thinner parts of the protective housing of the nerve are so placed that it is peculiarly liable to accidental and operative injury.

The forms of facial paralysis are classified as either central or peripheral. The central type includes those forms of paralysis in which the lesion affects the neurons and axons in the pons above the facial nucleus; the peripheral type includes those in which the lesion either is in the nucleus or affects the nerve distal to it. Peripheral paralysis may therefore be caused by an intracranial lesion, but it usually results from a lesion in the petrous pyramid or external to the pyramid. Most cases of facial paralysis are of the peripheral type.

When one considers these anatomic relations of the facial nerve it is surprising that attacks on its integrity do not occur more often. Interference with its function, of central origin, may be caused by inflammation, encephalitis, basal meningitis, suppuration, hemorrhage, softening, neoplasm, aneurysm or the complication of a constitutional disease, especially syphilis. Usually other nerves are involved, although Ney [1] claimed that in cases in which a tumor of the pontile angle is the cause only the seventh nerve is affected.

Peripheral paralysis may be the result of hemorrhage, lymphatic engorgement, tumor, accidental injury, such as fracture of the base of the skull, or operative injury, particularly in surgical procedures on the mastoid. The most frequent cause is neuritis. The neuritis may be a complication of a constitutional disease or may be a result of focal infection, of purulent otitis media or of an extension of infection of bone. The lymphatics and other glandular tissue which surround it after its exit from the stylomastoid foramen may involve it as the result of fulminating pharyngitis or cervical adenitis; so its relation to other structures renders it especially susceptible to infection and inflammation and to the double effect of neuritis and the resulting pressure.

In otherwise healthy persons exposure to wind and cold may be the exciting cause of an inflammation which usually affects the nerve from the stylomastoid foramen distally. Sometimes the inflammation extends upward into the aqueduct. By this type, commonly called Bell's palsy, females are attacked more often than males, and no age group

1. Ney, K. W.: Facial Paralysis, Laryngoscope **32**:327 (May) 1922.

is exempt. In one case that came under my observation in which the patient was a married woman of middle age the paralysis followed a severe emotional upset, and no other cause could be discovered.

Housed as it is in a long bony canal with other nerves and blood vessels, with the various structures completely filling the canal and with its sheath intimately attached to the walls of the canal, the inelasticity of its housing makes the nerve extremely susceptible to slight changes, whether the change is vascular, an inflammatory exudate within or without the nerve sheath or a narrowing of the lumen of the canal by periostitis. The slightest change, whether it is an enlargement of the contents of the canal or a narrowing of the lumen, thus becomes a definite compressive factor producing a functional disturbance. Whatever the primary cause, unless the nerve is severed the paralysis is probably caused more from the resulting pressure, whether it is from inflammatory exudates, hemorrhage or tumor, than it is from the neuritis.

Ney [1] said that not over 7 per cent of the cases of peripheral facial palsy are definitely associated with infection of the ears and that less than 1 per cent of all cases of otitic suppuration are accompanied by facial paralysis; but it is generally conceded that statistics concerning the etiology of facial paralysis in which involvement of the ears is a factor are not reliable on account of the frequent lack of a thorough examination of the ears.

The mode of involvement of the nerve in otitis media is not known with certainty. Ney [1] reported that his experience with patients with infected wounds incurred in war showed an intact nerve trunk to be very resistant to surrounding suppurative processes. The nerve may lie for many months in contact with active suppuration without functional impairment.

The subjective symptoms of facial paralysis are very slight, and there are practically no symptoms to attract the patient's attention. The diagnosis is made by observing the lack of voluntary action of the muscles of one or both sides of the face, including the muscles of the forehead and the muscles which close the eye on the affected side. Whether the condition is due to neuritis or to accidental or operative injury, it may vary from the partial paralysis caused by only a slight pressure, which can be seen only by close inspection, to the severe form resulting from section of the nerve, which gives the face a deformed appearance.

It should be determined before treatment is begun whether the paralysis is the central or the peripheral type, as the treatment of the two types is radically different. Rosenheck [2] has given a definite dif-

2. Rosenheck, Charles: A Consideration of Facial Palsies and Their Management, M. J. & Rec. **129**:266 (March 6) 1929.

ferentiation. In the central type the paralysis may be bilateral; if it is unilateral only the lower half of the face is paralyzed, the upper half escaping. In the peripheral type the paralysis is always unilateral, and the entire side of the face is involved. That the upper half of the face escapes in the central type is because in this part of the face there are muscles which act bilaterally and have representation on both sides of the cortex, so that if disease affects one side the other side continues to function. In the lower half of the face the muscles are strictly unilateral and are unilaterally represented. Bilateral facial paralysis may also occur in postdiphtheritic paralysis and when there is bilateral otitis media.

The site of the lesion in the peripheral pathway can also be fairly definitely located, especially if the lesion of the nerve is limited. This is important, as without this differentiation an attempt might be made to treat peripheral paralysis caused by an intracranial tumor in the same manner that one would treat paralysis caused by pressure within the facial canal. Jones [3] and Leiner [4] have worked out the data for such a differentiation.

Involvement of the geniculate ganglion alone results in a series of manifestations known as Hunt's syndrome. In addition to the paralysis there is a herpetic eruption in the external auditory canal and outer ear with severe neuralgic pains in the ear. Tinnitus and difficulty of hearing sometimes occur, and occasionally there are nystagmus, dizziness, nausea and vomiting.

If the lesion is above or central to the geniculate ganglion the sense of taste is not disturbed. Tucker [5] claimed that when the lesion is between the geniculate ganglion and the pons the cochlear nerve which lies near is almost invariably interfered with, causing nerve deafness on the affected side.

If the lesion affects the roots of the nerve in the pons the abducens nerve is usually affected, causing a swinging of the eyeball toward the inner canthus. This is because the facial nerve hooks around the abducens nucleus.

If the site of the lesion is in the canal above the point where the chorda tympani leaves the nerve and below the branch to the stapedius muscle the sense of taste in the anterior two thirds of the tongue on the same side is affected and there is an excessive flow of saliva.

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3. Jones, E. B.: Facial Paralysis Complicating Otitis Media, Ann. Otol., Rhin. & Laryng. **26**:523 (June) 1917.

4. Leiner, J. H.: Etiological Factors Bearing on Therapeutics of Bell's Facial Palsy, M. Rec. **95**:319 (Feb. 22) 1919.

5. Tucker, Beverly R.: Bell's Palsy and Its Treatment, South. M. J. **26**:291 (March) 1933.

If the lesion is above the twig to the stapedius muscle paralysis is accompanied by severe tinnitus and hyperacusis as a result of involvement of the tympanic branch and the unopposed action of the tensor tympani muscle.

Not including those cases in which there is a complete break in the continuity of the nerve and the treatment is surgical, peripheral facial nerve fibers show a high tendency to regenerate, and the prognosis is good even in cases of long standing if the cause is removed. Uncomplicated facial paralysis caused by neuritis is a benign disease from which recovery is probable. The time of functional recovery varies; in some cases the condition lasts a week or two and the patient recovers spontaneously, while in cases of the more severe type the patient may never completely recover even with the most assiduous treatment. With proper treatment the patient with a mild form usually recovers in from ten days to six weeks; in a more severe case from two to eight months is required, and in some cases there remains a permanent deformity.

It is the consensus that the treatment of facial paralysis when it is a complication of otitis media is primarily that of the aural condition. Conservative treatment is indicated as long as the disease shows a completely normal course and there are no definite symptoms of involvement of the mastoid. Morwitz,[6] after a study of the literature and experience with many cases, concluded that when the paralysis is a complication of acute otitis the treatment is essentially that of the aural condition per se and that the paralysis is not necessarily an indication for operation. When there is chronic otitis there is almost an absolute indication for operation.

In facial paralysis due to neuritis the treatment for the first two weeks or longer is rest and such measures as will allay the inflammation and so reduce the edema or infiltration and relieve the nerve of pressure. In this acute stage heat should be given in the form of hot compresses, radiation with infra-red rays or diathermy. The patient should be warned against "trying out" the muscles. Internally, sodium salicylate is given and antisyphilitic treatment is given syphilitic patients. In the subacute stage and in all cases of paralysis, whatever the cause, iodides should be given to absorb the infiltrate. Gentle massage may be given in this stage and a faradic current may also be carefully administered if there is no reaction of degeneration.

In the beginning the electrical responses of the muscles may remain unchanged even though paralysis is complete. At the end of from ten days to two or three weeks the electrical reaction should be tested. The degree of electrical response may vary from a mild degree to the

6. Morwitz, S. M.: Facial Paralysis Associated with Acute Otitis Media, Ann. Otol., Rhin. & Laryng. **37**:1263 (Dec.) 1928.

complete reaction of degeneration and is of value in determining approximately the length of time necessary for functional recovery. The greater the loss of reaction the more energetic the treatment should be and the longer it should be continued. After the disease has entered the chronic stage and a loss of electrical reaction is established remedies should be given to stimulate regeneration of the nerve and to absorb any exudate that may be present. Strychnine and the iodides should both be given, and systematic massage should be instituted. Sodium salicylate, the iodides and strychnine may all be given at the same time. The patient should try voluntary exercise daily. He should stand in front of a mirror and try to smile, close the eye, lift the eyebrow and reproduce all facial movements of which a normal person is capable. The treatment by the interrupted galvanic current should now be begun and should be continued for several months if necessary.

The treatment of facial paralysis in the later stages by physical therapy is the same whether the paralysis is the result of operation or injury, is an aural complication or is the result of neuritis. Galvanism should be given in the form of the negative interrupted current, and it is the most effective treatment there is in the later stages, especially in the more severe cases. It must not be given in a haphazard manner but carefully and systematically by a special technic and, if necessary, over a long period of time. Good results can be obtained with an inexpensive instrument if it will deliver an even flow of current. The technic as described is that used with a galvanic controller, the interruptions being made with the rheostat.

An electrodiagnosis should be made before treatment is begun. The following points on each side of the face should be tested for the reaction to electrical stimulus, these being the points on the affected side to be treated:

1. A point on the temple midway between the upper part of the auricle and the eye—the motor point for a reaction of the superior branch of the nerve.

2. A point on the cheek midway between the lobe of the auricle and the tip of the nose—the motor point for a reaction of the middle branch of the nerve.

3. A point on the cheek just anterior to and below the ear, slightly below the level of the angle of the mouth—the motor point for a reaction of the inferior branch.

The following points may be tested and treated if it is deemed desirable:

1. The forehead above the outer angle of the eye. The reaction is a lifting of the eyebrow.

2. The face, close to the nose and midway between the eye and the mouth. The reaction is seen in the lower lid and the mouth.

All points on the normal side of the face are tested first, the milliamperage required to produce a contraction of the muscles being noted. Normally this is from 3 to 5 milliamperes, but the amount may vary greatly.

TECHNIC OF GALVANIC TREATMENT

The negative electrode is a round fabric-covered electrode from ½ to 1 inch (1.2 to 2.5 cm.) in diameter.

The positive electrode should be somewhat larger.

Thoroughly moisten both electrodes with a saline solution.

Place the negative electrode over one of the motor points to be tested.

Place the positive electrode on the back of the neck or on the opposite side of the face or neck.

Move the rheostat slowly forward until the meter registers a current of 3 milliamperes.

Note the point to which the rheostat must be moved to register this amount of current, then move the rheostat back to zero.

Move the rheostat somewhat more quickly forward to this point and note if a contraction of the group of muscles is produced, then move it immediately back to zero.

If there is no contraction of the muscles repeat as before, moving the rheostat a little farther each time until a contraction of the muscles is produced, moving it each time immediately back to zero. Note the milliamperage required to produce a contraction of the muscles at this point and record the amount for future reference.

Test the other motor points on the normal side and record the milliamperage required at each point to produce a contraction of the muscles.

Now test the corresponding motor points of the paralyzed side in the same manner, note the milliamperage required to produce a contraction of the paralyzed muscles at each point and record the findings.

If more than 20 milliamperes is required to produce contraction of the paralyzed muscles the interpretation is that there is a complete break in the nerve impulse to those muscles. This may mean a severed nerve or pressure on the nerve from a fragment of bone, from scar tissue or from some other pathologic change. The important fact to note in this connection is that treatment with galvanism should not be given until pressure on the nerve has been removed, if possible; then treatment may be given and be required for a long time before results are obtained.

The technic for treatment is the same as the technic for electrical diagnosis, with a few modifications.

When treatment is first begun contraction of the muscles should not be produced. Begin treatments with approximately one-half the amount of current necessary to produce a contraction.

Have the patient attempt a voluntary contraction of the muscle group that is being treated at the same time that the current is applied.

In the beginning give only a few applications of the current to each muscle group at each treatment. If too many applications are given even a retrogression of function may be noticed following the treatment.

Gradually increase the number of applications given each motor point at one treatment as the patient improves and gradually increase the amount of current given until a slight contraction of the muscle group is produced.

Make the interruptions slow and wavelike, about twenty per minute. Too rapid interruptions exhaust the nerve.

PROGNOSIS

While in some cases of mild degree recovery is spontaneous and in others recovery occurs in a reasonably short time with rest and proper treatment, the great majority of cases require intelligent, energetic and long continued care and treatment to bring about recovery which even then may not include a complete return of function. Satisfactory results are usually obtained except in those cases caused by neoplastic infiltration, or in which there is a complete break in the continuity of the nerve, whether it is from unrelieved pressure, necrosis of the mastoid, operative accident or accidental injury. Even if the paralysis has lasted for a year or longer treatment should be given faithfully and energetically because partial recovery is sometimes obtained. One should not be discouraged by a loss of electrical reaction unless it is complete, or nearly so, because functional recovery always precedes recovery of electrical reaction.

Ney [1] has expressed the belief that after injury and surgical intervention, even though the nerve is completely severed within the temporal bone, its firm attachment to the periosteum of the facial canal does not permit its ends to retract, that the ends should maintain sufficient approximation to permit the regeneration of the nerve fibers of the proximal segment to reach those of the distal segment and that failure to regenerate is likely due to the presence of fragments of bone. When there is complete section of a nerve the sixth month should show the first evidence of returning voluntary power. No improvement after six months of treatment offers a poor prognosis, and after more than one year further treatment is useless and the problem goes into the realm of neurosugery.

FAULTY SURGICAL INSTRUMENTS AS A CAUSE OF FOREIGN BODY

CHEVALIER JACKSON, M.D.
AND
CHEVALIER L. JACKSON, M.D.
PHILADELPHIA

The lodgment of teeth, human bones and instruments in the human body during operations about the mouth has been previously considered.[1] There is, however, one phase of the matter that deserves further consideration, namely, faulty instruments.

These faults may be (*a*) in the use of poor or improper material; (*b*) in defective design, or (*c*) in improper tempering of steel instruments.

MATERIAL IN SURGICAL INSTRUMENTS

Rustless Steel.—The widespread use of nonoxidizable steel in household utensils and in the manufacture of metal in general suggests that a warning against its indiscriminate use for surgical instruments is advisable. The samples of rustless steel so far examined do not have the reliable qualities that would justify its use in delicate surgical instruments. The same may be said of vanadium and other alloys and even of self-hardening steel.

Tool-Steel.—Saws, rasps, rongeurs, knives, shears, scissors and cutting instruments in general should be made of the best of tool-steel. The same may be said of all steel instruments requiring an elastic reaction. Even then it must be remembered that "true as steel" is a poor metaphor. The best steel is unreliable; even under the best conditions of material and workmanship there remains an irreducible minimum of unreliability, as is mentioned in the section on tempering of steel.

From the Department of Bronchoscopy, Temple University.

1. (*a*) Jackson, Chevalier: Peroral Endoscopy and Laryngeal Surgery, St. Louis, The Laryngoscope Publishing Company, 1915 (this book is out of print, but it is in most libraries. The French translation entitled "Endoscopie et chirurgie du larynx" is still obtainable from the publisher, Gaston Doin, Paris); (*b*) Bronchoscopic Cases of Dental Interest: Dental Foreign Bodies in the Air and Food Passages, J. Am. Dent. A. **14**:1341 (Aug.) 1927; (*c*) Chronic Nonspecific Infections of the Lungs, J. A. M. A. **87**:729 (Sept. 4) 1926. (*d*) Jackson, Chevalier, and Jackson, Chevalier L.: Foreign Bodies in Air and Food Passages, in Jackson, C., and Coates, G. M.: The Nose, Throat, Ear and Their Diseases, Philadelphia, W. B. Saunders Company, 1929; (*e*) Bronchoscopy, Esophagoscopy and Gastroscopy, Philadelphia, W. B. Saunders Company, 1934.

Manufacture.—There is no method of working steel equal to hand forging followed by hand filing, tempering, grinding and sharpening, all done by skilled workmen. If the workmen have refractive errors, as is usually the case, they must wear glasses which provide proper correction. In addition, a magnifying glass is necessary in the making of very delicate instruments. So-called "heat treatment" of steel is not tool tempering, and like other modern processes of mass production is not suitable for the making of delicate surgical instruments. "Case hardening" also is not tempering and is likewise unsuitable.

Tempering of Steel.—Tool-steel has the property of adaptability to various uses by the process known as tempering. It is first hardened "right out" or "glass-hard." In this condition it is very weak and will not bend without breaking. Such hardness is not required in any surgical instrument unless for cutting metal, as, for instance, in wire-cutters, and in these only the cutting edge and enough nearby steel for regrinding need be hard. Rongeur forceps may have such a hard cutting edge, though it is not necessary; the heavy construction supporting the edge renders safe the weakness due to hardness. All delicate instruments for safety against breakage require the tempering process which increases the strength but reduces the hardness. Saws for cutting bone do not need to be as hard as those for cutting metal, and what hardness is left need be only at and near the cutting edge. The butcher saws bone day in and day out with a saw soft enough to be sharpened with a file. The hack-saw for metal cannot be filed because it is too hard. Files and rasps for work on metal must be as hard as fire and water can make them; if they break in use no harm is done.

Rasps for bone used by the surgeon do not need to be so hard. Unfortunately, the surgeon's rasp looks like a file for metal, and the workman leaves it as he would a file, that is, glass-hard and consequently very weak and friable. All the fragments of nasal rasps removed from the bronchi (fig. 2, *J*, *K* and *L*) are of this dangerous and entirely unnecessary degree of hardness. What hardness is allowed to remain should be at and near the cutting edges of the serrations; the back and stem of the tool should be drawn, or tempered, to the degree that will insure bending before breaking. There is, so far as can be discovered, no such rasp to be had in the shops; all those examined were glass-hard. This same error of hardness was evident in the tonsil knife that broke in one of our cases (case 4). There is no need of such hardness; a keen edge is not necessary or even desirable in a tonsil dissector. If it were, the temper could be drawn from the back, leaving the edge hard. Certainly there is no need of hardness at the angle. At this point of greatest strain (fig. 2, arrow in *G*) the temper should be drawn to the degree that will insure bending before breaking. The same may be said of the bistoury (fig. 2 *F*).

Testing the Temper.—The best way to test the temper of steel is with a file. If the steel is glass-hard the file will slide off, making scarcely a mark. If, on the other hand, the temper is drawn sufficiently to make it safe from breakage the file will be felt taking hold of the steel without slipping off. Of course, this method of testing is used by the instrument-makers, if at all, only after the instrument has been polished. In making the instrument the temper is drawn while watching the changes of color, and drawing is stopped when the proper color is reached.

Springs.—To obtain good elastic reaction in a steel instrument it must be hard to a degree that is very close to the limit at which it will break before it will retain a bent position. In this state steel is unreliable. No manufacturer of watches or other spring-driven machines will guarantee that a spring will not break; they will replace it free of charge, but they will not and cannot guarantee against breakage. This concerns steel springs oiled and protected in metallic cases. Obviously, much less can be expected of the springs of delicate surgical instruments subjected to boiling, corrosion, excessive strain and stress not only in use but in the sterilizing room. Even in the most perfectly tempered steel spring there is a limit of elasticity that cannot be passed without deterioration of the steel and ultimate breakage (fig. 2 *L*).

Cold Bending of Steel.—It must be remembered that the excessive strain of use deteriorates steel. Bending of spring-tempered steel will not deteriorate the steel if the limit of elasticity is not passed. When, however, this limit is passed and a bend is retained spring-tempered steel is damaged. In the case of surgical instruments the bend should never be straightened, and the instrument should never be used again (fig. 2 *L*). When the steel-worker wishes to bend tool-steel he heats it (it might be added that he is careful not to overheat it). If it is necessary to have a steel instrument that will stand cold bending back and forth it must be annealed; that is, the hardening must be completely removed.

Care of Instruments.—That all surgical instruments should be cleaned immediately after use is a universal rule. But it is not so generally realized that all steel instruments should be put away dry and kept dry. In addition, if not used frequently, say once a week, they should be oiled to prevent oxidation. It is safe to say that except for the cataract knives of the ophthalmic surgeon no surgical instruments receive the care that would insure perfect performance and dependableness. Boiling will not injure anything except fine cutting edges or thin, thread-like instruments, unless the water is impure. Chlorine, now used in the purification of city water, will corrode steel instruments in boiling. Acids from industrial plants make the water

of many rivers unsuitable for boiling steel instruments; if the litmus test shows acidity sodium carbonate sufficient for neutralization should be used. Cutting instruments requiring alcoholic sterilization may be ruined by some of the denaturing substances.

Our nurses in charge of the instruments are trained to look for and report cracks or defects and especially to report bent instruments —never to put them away and never to straighten them.

Results of Faulty Manufacture.—A number of clinical cases indicate that avoidable accidents have been due to faults in the manufacture of instruments. This does not imply negligence on the part of the instrument-makers; they are individually and collectively desirous of fulfilling all requirements of the medical profession. It seems that the rhinolaryngologist himself is not aware of the defects herein referred to and consequently has never specified his requirements. Suggestions made a few years ago have gone unheeded.[2]

In three cases, in the hands of three different surgeons, a nasal rasp, in each instance made by a different manufacturer, has broken during an operation on the nose, and the detached piece has been inspired into the bronchi. Of course, we have no means of knowing of the doubtless hundreds of cases in which a nasal rasp has broken and the fragment was either recovered or spat out, or perhaps swallowed and passed through the intestines. It seems a justifiable inference that if in three cases the fragment reached the bronchi there must have been many other cases in which the broken instrument did not result in a foreign body in a bronchus.

REPORT OF CASES

CASE 1.—*Part of a nasal rasp bronchoscopically removed from the bronchus of the lower lobe of the left lung.*

A man aged 45, under ether anesthesia, during an operation by a rhinologist for empyema of the maxillary antrum, inspired the end of a nasal rasp that broke off in the nasal chamber. Roentgen examination revealed the fragment in the lower lobe of the left lung. The patient was then referred to our clinic. Except for a slight cough no symptoms were present on admission. Physical examination revealed jerkiness and limitation of expansion on the left side. By means of the bronchoscope the foreign body was found in a posterior branch of the bronchus of the lower lobe near the periphery of the lung. The problem of removal involved toggle action and was readily solved. The limitation of expansion entirely disappeared. Recovery was uneventful.

Comment.—The foreign body (fig. 2*I*) was 22 mm. in length and curved on a radius of about 5 cm. A test of the instrument with a file showed it to be glass-hard. There had evidently been no tempering of the steel. A roentgenogram of this patient has been published.[2]

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2. Jackson, Chevalier, and Jackson, Chevalier L.: Surgery of the Larynx and Trachea and Endoscopic Surgery of the Bronchi, in Lewis, Dean: Practice of Surgery, Hagerstown, Md., W. F. Prior Company, Inc., 1932, vol. 4, chap. 7, p. 1. Footnote 1d.

CASE 2.—*Part of a nasal rasp bronchoscopically removed from the bronchus of the lower lobe of the left lung.*

A woman aged 23 was undergoing an operation on the nasal accessory sinuses under local anesthesia when the rasp broke. The patient felt something in the throat for a moment, after which there were no subjective sensations. A roentgenogram showed the rasp in the lower lobe of the left lung near the diaphragm. On admission to the bronchoscopic clinic the patient was symptomless except for a slight cough. There were no physical signs except for limitation of expansion on the left side, especially in the lower portion. By means of the bronchoscope the portion of rasp was found in a median branch of the bronchus of the lower lobe. A tendency to toggle action because of presentation of the middle portion was overcome by gently guiding the foreign body downward and sheathing the end in the mouth of the tube. The limitation of expansion disappeared. Recovery was uneventful.

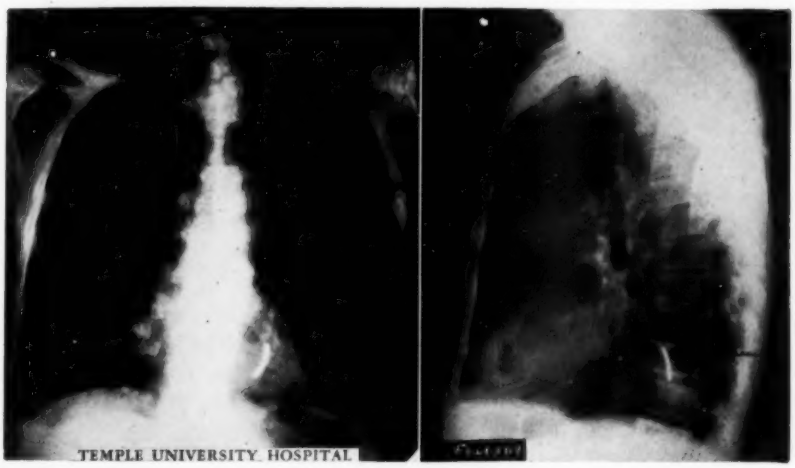

Fig. 1 (case 3).—Roentgenogram of a man aged 50, showing a portion of a nasal rasp in the bronchus of the lower lobe of the left lung. As in two other cases, the accident could not have occurred if the instrument had been properly tempered.

The foreign body (fig. 2*J*) was 23 mm. long and curved on two radii, the shortest of which was about 3 cm. It was glass-hard when tested with a file. A roentgenogram of this patient has previously been published.[2]

CASE 3.—*Part of a nasal rasp bronchoscopically removed from the bronchus of the lower lobe of the left lung.*

A man aged 50 was undergoing a bilateral Caldwell-Luc operation for extensive sinus disease when the rhinologist noted that the rasp had broken and a portion of the distal end was missing. After the patient recovered from the anesthesia (ether) a roentgenogram showed the foreign body in the lower lobe of the left lung. On admission to the bronchoscopic clinic a few days later the physical signs were those of diffuse bilateral bronchiectasis. The roentgen examination revealed extensive pansinusitis and shadows indicating extensive bronchiectasis. By means of the bronchoscope great quantities of foul pus were aspirated. The

bronchi were diffusely dilated and showed the characteristic appearance of bronchiectasis of many years' duration. The piece of rasp was found and removed with no difficulty. The patient left for home two days later in as good condition as he had been before inspiration of the piece of rasp. The bronchiectasis antedated the presence of the foreign body.

The foreign body measured 31 mm. in length with a curve on a radius of about 36 mm. (fig. 2 *K*). It was glass-hard when tested with a file.

Comment.—The foregoing cases were peculiarly alike. In all three the foreign body went into the left lung (the curve may have had something to do with this). In all three the accident would not have happened if the instrument had been properly tempered by the instrument-maker. In two of the cases local anesthesia was being used, and the patient was in a sitting position; in one case ether anesthesia was used with the patient in a recumbent position. In each case a suit for malpractice was instituted but did not come to trial; the rhinologist had promptly had roentgen studies made and had a bronchoscopic examination performed so that no negligence could be shown. In all three cases the patient was none the worse for the accident.

CASE 4.—*A piece of tonsil knife removed bronchoscopically from the bronchus of the lower lobe of the left lung.*

A girl aged 16 years inspired a portion of a tonsil dissecting knife when it broke off during a tonsillectomy performed under local anesthesia with the patient in the sitting position. The rhinologist promptly had roentgen studies made which localized the fragment of knife in the bronchus of the lower lobe of the left lung. The surgeon then brought the patient to the bronchoscopic clinic. There was no cough or other symptom. Physical examination gave negative results. By means of the bronchoscope the blade was found in an internal branch of the bronchus of the lower lobe; removal presented no difficulty. There was nothing from which to recover. The temperature was normal when the patient was admitted, and it remained so. There were no symptoms, not even a slight cough either before or after the blade was removed. The fragment of knife was 16 mm. long and curved on two radii, the shortest of which was 12 mm. (fig. 2 *G*).

On testing the piece of knife with a file it was found to be very hard, and equally hard on the edge and the back and at the angle where it broke. This faulty manufacture was the cause of the accident; it could not have happened with a properly tempered instrument.

CASE 5.—*A catch of a tonsil forceps removed bronchoscopically from the bronchus of the lower lobe of the right lung.*

A boy aged 7 years was undergoing a tonsillectomy in the recumbent position under ether anesthesia when the spring-catch of the tonsil forceps broke. As soon as the child had completely recovered from the anesthesia the rhinologist had a roentgen study made which revealed the missing end of the catch in the lower lobe of the right lung. At the bronchoscopic clinic we found no roentgenographic signs of a pathologic process in the lung, but there was limitation of expansion over the lower quadrant of the chest on the right side. By means of the bronchoscope the fragment of instrument was found in an external anterior branch of the stem of the bronchus of the lower lobe, whence it was removed without difficulty. Recovery was uneventful.

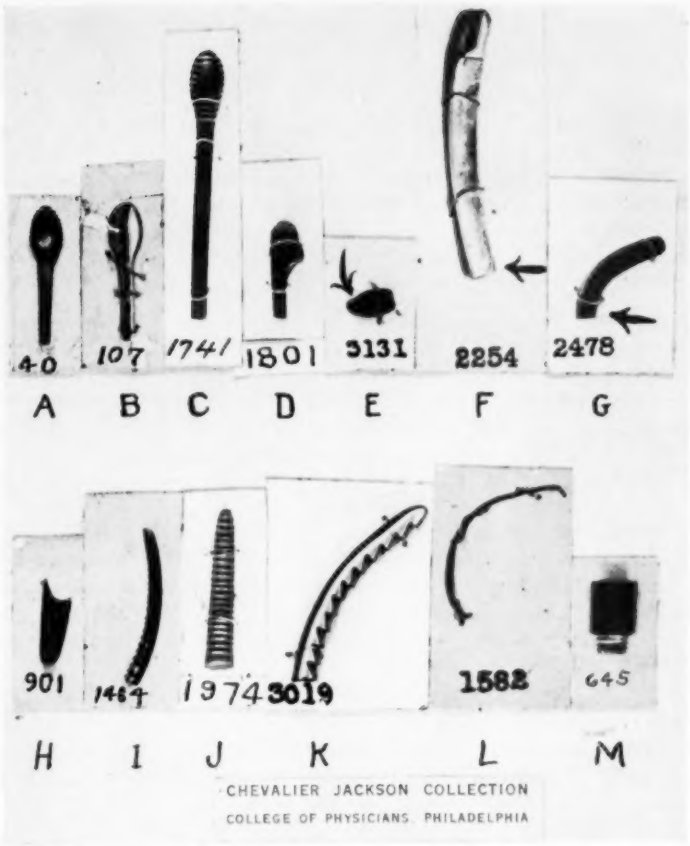

Fig. 2.—Parts of steel instruments that broke and became foreign bodies in the air and food passages. Such accidents are preventable if the temper is properly drawn when the instruments are made. *A* is the jaw of an esophagoscopic forceps which was broken during an esophagoscopic examination. It was removed from the stomach of a man aged 32 by means of a gastroscope. *B* is the jaw of a bronchoscopic forceps which was removed from the bronchus of the upper lobe of the left lung of a girl aged 2 years. It was broken during a bronchoscopic examination by our predecessor. *C* is a jaw broken off a gastroscopic forceps during a gastroscopic examination of a man aged 54. It was removed perorally by means of a gastroscope. *D* is a blade of a forceps removed by means of a bronchoscope from the bronchus of the lower lobe of the left lung of a child aged 5 years. *E* is the jaw of a bronchoscopic forceps which was broken off when a tooth lodged in the bronchus was grasped. The patient was a boy aged 9 years. *F* is a portion of a probe-pointed bistoury which was removed by means of a bronchoscope from the bronchus of the right lung (case 6). The blade broke during a tracheotomy because it was hardened and not tempered. It was additionally weakened by being ground too thin at the point indicated by the arrow, which was the point of greatest stress. *G* is a fragment of a tonsil knife which was removed by means of a bronchoscope from the bronchus of the left lung (case 4). It broke off during a tonsillectomy for the same reasons as in case 3.[1c] *H* is the catch of a tonsil forceps which was removed by means of a bronchoscope from the bronchus of the lower lobe of the right lung (case 5).[1c] It broke off during a tonsillectomy. The instrument had been hardened and not tempered. *I*, *J* and *K* are three pieces of a nasal rasp, each of which was removed from the bronchus of the lower lobe of the left lung of a different patient (cases 1, 2 and 3). In each instance the accident could not have occurred had the instrument been properly tempered. *L* is a part of the loop of a tonsil snare wire which was removed from the bronchus of the lobe of the right lung of a boy aged 12 years.[1c] The wire broke because it was bent beyond the limit of elasticity ("kinked short"). The short bending was due to a defect in the design of the instrument. *M* is a lamp which was removed by means of a bronchoscope from the bronchus of the right lung of a boy aged 6 years.[1c] The lamp dropped from its place in the mouth gag because the socket was a bad fit, i. e., oversize.

The forceps is known as the Robertson tonsil-holding forceps. The accident was not due to the design of the instrument but was due altogether to the fact that the temper was not drawn low enough to insure adequate strength. The fragment (fig. 2 *H*) was found to be very hard when tested with a file. A roentgenogram of this patient has been published.[1c]

CASE 6.—*Blade of a bistoury removed bronchoscopically from the right bronchus.*

A man aged 62, with an extensive cancer of the larynx, required tracheotomy to prevent asphyxia. In enlarging the tracheal incision downward the probe-pointed curved bistoury broke off at the proximal end of the cutting part, and the detached fragment (fig. 2 *F*) slid down the trachea into the right bronchus. A bronchoscope was inserted, and the fragment of instrument was grasped with a side-curved forceps and removed. The steel was tested with a file and was found to be very hard at the back as well as at the edge.

Although the patient was none the worse for the accident the breakage was altogether unnecessary. A hard temper in any knife is necessary to take and hold a keen edge, but the temper can be drawn at the back of the knife so that it will bend before it will break. Moreover, in grinding, this knife had been cut away more than necessary at the point of breakage, which is precisely the point of greatest strain in a bistoury of this type (fig. 2 *G*, arrow).

CASES 7, 8, 9 and 10.—*Endoscopic forceps jaws.*

In these four cases the jaw of an endoscopic forceps was removed from the air and food passages. They were removed by means of the bronchoscope at once, and no ill effect followed in any case. In each of these fragments (fig. 2, *I*, *J* and *K*) the temper of the steel was too hard.

It is true, however, that even if the temper is drawn to the point at which the instrument will bend before it will break, the limit of elasticity may be passed and the breaking point may be reached if the jaws are bent back and forth a few times. Forceps jaws when brazed on the stem and from there out to the base of the jaw must be of spring-temper. This is very close to the limit of elasticity. It must be remembered that the mechanical movement in forceps used in the tubes puts a strain on the jaws that is enormous considering their necessarily delicate form. It is the relatively powerful grasp that makes the cannular type of forceps unequaled for security of hold. With this type of instrument, if the jaws are once bent they should never be straightened; a whole new stylet is required. Eternal vigilance is necessary to prevent nurses and assistants from following the natural inclination to straighten a bent instrument.

LEGAL LIABILITY

In all of the cases reported here the surgeon was not at fault, as he had no means of knowing about the temper of the instrument, nor is it expected that a surgeon should know. He buys the best instruments he can get and depends on the instrument-makers to have them of proper temper. Moreover, there is no liability for a mere accident. Liability for malpractice would come into the case if there were negligence or lack of ordinary skill and judgment on the part of the surgeon. The

obligation to avoid negligence requires that when an accident occurs the surgeon take promptly whatever steps may be necessary for the best interest of his patient. Obviously this requires that he immediately make a roentgen examination to ascertain where a portion of a broken instrument, for instance, is located. Physical examination of the chest is necessary in any case, but especially so in case of a possibly radioparent foreign body. Of course, all the foregoing measures require that the patient be told of the accident. Here one encounters the natural feeling of the surgeon that he should not unnecessarily worry his patient until he has determined whether or not there is anything about which to worry. On the other hand, the attorney for the plaintiff will ridicule any such fine feelings and attribute the failure to notify the patient to sordid motives. It was the prompt care of the patient's best interests that enabled a successful defense in the cases herein cited.

WHAT TO DO IN CASE OF ACCIDENT

If the accidental breakage of an instrument has resulted in a missing fragment during an operation on the nose the surgeon will naturally at once inspect the operative field. If the foreign body is visible without cleansing the field it should be promptly grasped. If, however, the fragment cannot be thus seen the first step is the roentgen examination. After fluoroscopic examination, whether the results are positive or negative, films should be made in both anteroposterior and lateral projections, including the head, neck and trunk, from the roof of the nasal chambers to the tuberosities of the ischia. At least one set of these films should be overexposed in the quantity of current used, not in the length of exposure because of the blurring effect of movement, all of which is well known to experienced roentgenologists.

Whether or not the foreign body is found in the roentgen studies, physical examination of the chest is always in order.

If the foreign body is found by roentgen examination to have lodged in the nasal passages it should be removed at once or as soon as conveniently possible by the surgeon himself in order to avoid the possibility of accidental dropping downward. The aid of the double-plane fluoroscope may be required in finding the foreign body in the nasal passages or sinuses when the surgeon is unable to see it by direct vision. In making this search either with or without the fluoroscope, and especially before sponging or otherwise clearing the field, it might be well to place the patient in the position advised for the removal of foreign bodies overhanging the larynx.[3] In this position the table is inclined steeply toward the head of the patient so that if the foreign body should be lost it will not have the aid of gravity to reach the lower air and food passages, but will lodge and remain in the nasopharynx.

3. Footnotes 1d, 1e and 2.

If the examination should show the foreign body in the larynx, direct laryngoscopic removal is indicated. In doing this the inclined position already mentioned should be used. In this position a little local anesthetic may be dropped in the laryngopharynx. Before using the direct laryngoscopic technic preparation should be made for the use of the esophagoscope and bronchoscope because of the possibility of dislodgment downward.

If the foreign body is found to have reached any part of the tracheobronchial tree a bronchoscopic examination should be carried out without unnecessary delay. This does not mean that the patient is to undergo a bronchoscopic examination at midnight if he should arrive at that time. The matter of a week or two usually makes no difference, so far as our records show. We have not yet seen a surgical or dental instrument, no matter how septic the field from which it has come, set up a septic process in the bronchi within a few weeks' time; and if not obstructive it is probable that steel instruments could remain six months without doing any serious amount of injury to the tissues by infection or otherwise. Eventually they would cause pathologic changes.

If the roentgenogram shows that the foreign body has lodged in the esophagus the intruder should be removed by means of the esophagoscope. A delay of a day or two will involve no additional risk, but a delay of more than a week or two is inadvisable.

If it should be found that an instrument or a fragment of an instrument has gone into the stomach it may require removal by means of the gastroscope; but in the case of most instruments nothing need be done except to watch the intruder through the intestines by daily examination with the fluoroscope. If it lodges anywhere in the intestinal tract for more than four or five days the question of external operation should be considered. If, on the contrary, it keeps moving, nothing need be done until it has been passed. Cathartics should not be given nor should the instructions found in textbooks to give bulky food be followed. Any change in diet is likely to cause increased peristalsis from intestinal indigestion. For the same reason laxatives should be forbidden. The safest condition for passage of a foreign body in the intestines is in the normal intestinal contents.[4]

CONCLUSIONS AND SUMMARY

In three cases a steel rasp broke, and the portion broken off went into the bronchi, whence it was removed bronchoscopically. Test of the fragments with a file showed that they were hardened right out or glass-hard and were not tempered. This was the cause of the breakage. Evidently the instrument-maker thought that as the rasps

4. Jackson, Chevalier, and Jackson, Chevalier L.: Foreign Bodies in the Intestines, M. Rec. **140**:285 (Sept. 19) 1934. Footnote 1a.

looked like files for work on metal they should be hardened and left untempered, like files. The temper should be drawn, at least on the back of the instrument, to the point at which it will bend before it will break. Investigation has so far failed to disclose properly tempered rasps in any of the shops. Unnecessary risks are being run; no harm resulted to the patient in any of the cases, but in all three the surgeon was annoyed by both chagrin and litigation.

In three other cases breakage of a tonsil forceps, a tonsil dissecting knife and a probe-pointed bistoury was due to the same cause. A degree of hardness is required to take and hold a keen edge, but untempered hardness is not necessary, and a keen edge is not needed on a tonsil knife. Moreover, the temper can be drawn on the back if it is desirable that the edge be hard.

If the surgeon does encounter breakage and loss of part of an instrument that becomes a foreign body he should at once inform his patient and have a roentgenogram made so that endoscopic removal may be done without delay. The surgeon is not liable for the mere accident of breakage, but he is liable for negligence if he fails to take prompt and proper steps to guard his patient's health.

CORRECTION OF SADDLE NOSE

GEORGE D. WOLF, M.D.
Attending Oto-Laryngologist, Sydenham Hospital, and Attending Laryngologist, Riverside Hospital
NEW YORK

Saddle nose is the most disfiguring of the commonly encountered nasal deformities. It constitutes a real handicap in the lives of those so afflicted. Not only are they psychologically maladjusted, but they often experience added difficulty in their efforts to earn a livelihood. They are therefore entitled to as much attention on the part of the surgeon as sufferers from any other clinical ailment.[1] Fortunately, saddle nose is one of the facial deformities which responds satisfactorily to correction. The patient is almost invariably gratified by the decided improvement in his appearance, and his gratification is increased by the favorable comments of his friends.

The correction of saddle nose is of particular interest to rhinologists since the deformity is occasionally caused by operations on the nose.

The technic for the correction of most of the common nasal deformities has been fairly well standardized in recent years. Except for certain minor variations, the method of Joseph [2] is almost universally accepted. The procedures followed in the correction of the various types of malformation are approximately the same except for modifications necessary in particular cases. As in other branches of surgery, the results in a given instance depend to some extent on the skill of the surgeon, his past experience and, perhaps most important, his exercise of judgment in the general management of the individual case.

Saddle nose is the only nasal deformity regarding the correction of which there is still a considerable difference of opinion. Rhinoplastic surgeons are not in agreement as to the materials to be used in filling the defect and the route to be followed in placing the implant.

MATERIALS AND TECHNIC USED FOR REPAIR

Autoplasty, alloplasty and zooplasty have all been recommended as the method to employ in making implants.

Autoplasty has been generally favored. The materials used are the turbinates, septal, auricular, lateral or costal cartilage and bone. The

1. Wolf, George D.: Rhinoplasty: Facts and Fiction, Arch. Otolaryng. **11**:322 (March) 1930.

2. Joseph, J.: Nasenplastik und sonstige Gesichtsplastik, Leipzig, Curt Kabitzsch, 1928.

cartilages of the nasal tip may furnish fragments sufficient to correct small deformities. It is also possible to use septal, auricular and lateral cartilages if a large implant is not necessary. However, when more extensive repair work must be done recourse is had to costal cartilages or to bone.[3] The tensile strength of cartilage of the ribs and its lack of absorption, as well as its ready availability, make it a good medium. Cartilage is taken from the seventh, eighth and ninth ribs, preferably on the right side (to avoid the cardiac structures). When cartilage is used most authorities recommend the removal of the perichondrium, the retention of which causes the cartilage to curl. Some, on the other hand, consider that the perichondrium should be retained, curling being prevented through perfect technic.

The use of cartilage of the ribs offers certain disadvantages, the most important of which is the entailment of a double operation with its concomitant dangers. Pleural injury or hematoma is always a possibility, although such a complication is rare when the operation is carefully performed. The tendency of cartilage of the ribs to curl may prove a marked detriment when a single straight graft is required. Occasionally a rib will prove to be of insufficient thickness. If it becomes necessary to use several fragments the task becomes more laborious and the end-results more problematic, since the pieces may slip from their original position. Patients frequently object to submitting to two operations, preferring to avoid the additional hospitalization and the scarring of the chest.

Bone (with or without its periosteum) removed from the anterior crest of the tibia or the scapula has also been used for the reconstruction of saddle nose. However, even when the periosteum is included, the bone, which cannot be attached at both ends, is progressively absorbed. It is therefore necessary to use an unusually large implant, which causes the initial cosmetic effect to be far from handsome.

Fascia has also been employed but has been discarded in favor of other mediums.

Alloplasty with gold or other metals or their alloys and celluloid may bring about creditable results at first. On the other hand, the alien nature of the material and its great dissimilarity from body tissues may cause its ultimate expulsion as a foreign body. Paraffin is mentioned only to be condemned.

In zooplasty bovine cartilage has been employed for nasal reconstruction in some instances.[4] The cartilage is taken from the scapula of an ox. It is claimed that there have been no allergic manifestations.

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3. Carter, William W.: Value of Bone and Cartilage Grafts in Rhinoplasty, Laryngoscope **43**:905 (Nov.) 1933. Kazanjian, V. H.: Nasal Deformities and Their Repair, ibid. **43**:955 (Dec.) 1933.

4. Stout, Philip S.: Bovine Cartilage in Correction of Nasal Deformities, Laryngoscope **43**:976 (Dec.) 1933.

Joseph of Berlin reported in 1918 very favorable results with the use of ivory in saddle noses. When a large graft is required, ivory offers the best material.[5]

Broadly speaking, there are two groups of cases: (1) those caused by syphilis, either congenital or acquired; (2) those resulting from other causes. The latter include congenital factions or results of trauma, operations on the septum, septal abscess, ozena and nasal lupus.

For practical purposes the types of saddle nose may be divided into three categories:

First Degree (fig. 1).—Defects of this type, in which only a small graft is required, can be easily corrected by the use of auricular, septal or lateral cartilages.

Second Degree (fig. 2).—In this category are placed larger defects which can be repaired by the use of the same materials as mentioned for defects of the first degree, but in larger quantity. Frequently there

Fig. 1.—Photographs of a patient (*A*) before operation, with a first degree deformity following a septal abscess which was amenable to correction by lateral cartilages alone, and (*B*) after operation, showing the results of correction.

has been no loss of substance in saddle noses of these two divisions; all that is necessary is a rearrangement of the cartilage already present, with perhaps a slight addition of cartilage from the ear.

The technic of correction for defects of the first and second degrees is the same. The upper and lower cartilages which are removed for the purpose of narrowing the tip and the lower part of the nose are placed in warm saline solution (about 100 F.) and are left there while the other surgical work is being done. When this work has been com-

5. (*a*) Salinger, Samuel: Cartilage and Ivory in Plastic Surgery of the Nose, Arch. Otolaryng. **6**:552 (Dec.) 1927. (*b*) Maliniak, Jacques: Cartilage and Ivory: Indications and Contraindications for Their Use as Nasal Support, Arch. Otolaryng. **17**:649 (May) 1933. (*c*) Wolfe, M. M.: Plastic Surgery of the Saddle Nose, Laryngoscope **43**:897 (Nov.) 1933. (*d*) Watkins, A. B. K.: Notes on Nasoplastic Surgery, J. Laryng. & Otol. **48**:809, 1933.

pleted the pieces of cartilage are gathered together in a suitable form. A no. 0 catgut suture is passed through them and tied. The edges of the cartilage fragments are trimmed to make the implant smooth and well fitting. The implant is then inserted subcutaneously into the defect and the wound is closed.

Third Degree (fig. 3).—This group includes deformities of large size, in which the substance to be used for repair must be carefully

Fig. 2.—Photographs of a patient (*A*) before operation, showing second degree deformity following an intranasal operation (?) which was amenable to correction by implantation of upper and lower lateral cartilages, and (*B*) after operation, showing the results of correction.

Fig. 3.—Photographs of a patient (*A*) before operation, with a third degree deformity requiring an ivory implant, and (*B*) after operation, showing results of correction.

selected. Alar and aural cartilage will not provide a sufficient amount of material; the choice is between cartilage and ivory.

As indicated earlier, I believe that ivory gives the best results. It is an organic substance the chemical composition of which greatly resembles that of human bone, differing only in that human bone contains

a relatively greater proportion of magnesium phosphate. However, unlike bone, ivory is never absorbed.[6] It is available in quantities enough for even the largest graft and does not bend as cartilage does. Ivory may be accurately carved before the operation and is easily sterilized by boiling. This is undoubtedly a great advantage, since it permits careful fitting in advance and an unhurried operation. Although the implant remains mobile on the bony foundation, no displacement occurs since it quickly becomes surrounded by a fibrous capsule. The use of ivory obviates the necessity of an operation on the rib, a factor which recommends it to patients.

Fig. 4.—A roentgenogram showing the ivory implant.

Objections to ivory have been raised on two grounds: first, that it is a foreign body, and, second, that it is liable to expulsion. There is no need for prejudice against the use of foreign bodies; in certain types of work they have their place. There is no objection, for example, to its use in the filling of teeth or in oral bridgework. As for expulsion of ivory implants, the experience of many surgeons corroborates my own, that ivory prostheses are retained for long periods. Ivory implants have been exchanged for various reasons from one to seventeen years after insertion, and it was evident on their removal that they had undergone no change.[5c] In the few cases in which an infection occurs and the ivory is expelled the cartilage implant may still be made. The subsequent implantation will be simpler since the ivory will have created

6. Maliniak, J.: Use of Ivory in Rhinoplasty, Arch. Otolaryng. **1**:599 (June) 1925.

a fibrous foundation and will have furthered changes in the shape of the nose and the canal in which the second implant is to be placed.

METHODS OF CORRECTION

Each saddle nose offers its own problem, to be solved according to its particular requirements. A considerable amount of experience is necessary for the correct shaping of the implants, and the beginner will meet some difficulties.

It is important to be sure that one is using true ivory and not vegetable or pseudo-ivory, which may resemble it closely. Since only organic elephant ivory approaches human bone in its structure, it alone should be used for nasal reconstruction. To test the authenticity of the substance it should be treated with sulphuric acid for fifteen minutes. True ivory will remain white, while vegetable ivory will become rose-colored (this coloration will disappear if the vegetable ivory is washed in water).[6]

Particular care is necessary in preparing the implant, which should be fitted on the defect before it is inserted. Although this may be done on the nose of the patient, it is preferable to use a cast for the preliminary work since revision and realinement have a poor psychologic effect on the patient. The final trial may be made on the face the day before the operation.

It is important that there be no sharp edges at any part of the finished prosthesis. Proper fitting is essential. The implant should not be so small that it will move about (for example, when the patient washes his face), nor should it fit so tightly that the pressure might cause gangrene of the skin. The process of carving has been described by Joseph, his method being to fasten the ivory fragment to the wall by means of a vise and shape it with files.[2] Salinger used a jig-saw and grindstone to shape the implant and sandpaper on a dental cable to even the rough edges. More rapid and more efficient work can now be done by the use of a motor-driven lathe, which produces a far smoother edge. However, unless one has had a great deal of experience in carving, it is common to find that despite the most careful preoperative fitting the implant has been made too large to be easily inserted. The graft which seemed to fit well on the patient's skin does not fit well under it (fig. 4).

Most saddle noses are abnormally wide, with negroid nares. It is necessary not only to remedy the depression but also to make the tip and bridge narrower and to correct the nares. A two stage operation is preferable. At the first operation the deformities in the bridge, the tip and the nares are corrected. Three or four weeks are allowed to elapse before the second stage, when the ivory implant is inserted.

The two stage operation carries, of course, a double exposure to infection, and many patients object to the additional hospitalization. Both procedures can be done at once if necessary; it is possible to achieve creditable results in a one stage operation.

Intranasal infection constitutes a contraindication to any operative procedure for cosmetic purposes.

Routes of Operation.—There has been much controversy about the question of the route to be employed for the placing of the implant, both the intranasal and the columellar routes having been advocated. It is claimed by some that one should not attempt the endonasal incision because of the danger of carrying infection and of bringing the ivory too close to the mucous membrane.

I have found that in cases in which only one implant is necessary and in which there is only one pronounced defect to be repaired the columellar incision is the most practical. When other work on the nose is being done at the same time, the intranasal route is more advisable. The risk of infection is minimized by the fact that nasal tissue has a local immunity. With good technic and perfect asepsis the danger of infection is hardly greater than that incurred in operation by way of the columella.

Anesthesia.—My nasoplastic operations proceed very smoothly as a general rule with the use of local anesthesia, preceded by two 3 grain (0.18 Gm.) doses of sodium amytal and the injection of morphine sulphate and hyoscine immediately before the operation. In rare instances the medication causes the patient to be excited during the operation. In the vast majority of cases, however, the anesthesia is so satisfactory that the patient remains under the impression that he was under general anesthesia.

Avertin as a basal anesthetic, with or without ether, avoids the occurrence of excitement. Reports [7] have emphasized the great advantages inherent in the use of avertin: the absence of preoperative shock and apprehension, the low incidence of nausea and vomiting, the long duration of the anesthesia and the ensuing amnesia. The use of general anesthesia or avertin also prevents distortion of the facial tissues which occurs after the injection of local anesthesia.

When an implant is to be inserted and no other operation on the nose is being done, N-methyl-cyclohexenyl barbituric acid may be used to advantage.

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7. Pearse, J. E., Jr., and Wiedrich, M. M.: Avertin Anesthesia, New York State J. Med. **33**:385 (March 15) 1933. Johnson, V. Earl; Sheppa, Pauline, and Haffey, Mary: Avertin Rectal Anesthesia, Am. J. Surg. **25**:476 (Sept.) 1934. Shipway, Francis: Note on Avertin Anesthesia in Operations on the Upper Respiratory Tract, J. Laryng. & Otol. **48**:389 (June) 1933.

SUMMARY

1. Saddle nose is most satisfactorily corrected of all the common nasal deformities. It is the only one regarding the correction of which a considerable difference of opinion exists. This difference applies chiefly to the material used for implants and the incision used for inserting them.

2. Alloplastic materials (gold, silver and celluloid) are now little used, since they are too frequently expelled as foreign bodies.

3. Septal, lateral and auricular cartilage is used for the repair of small defects.

4. Use of cartilage of the ribs, though readily available for larger defects, has several disadvantages in that it has a tendency to curl, may be insufficient in thickness and in any event necessitates a double operation which is risky and is usually objectionable to the patients. Bone is too easily absorbed to be of value.

5. Ivory is the best material for the repair of saddle nose since it is easily sterilized, can be carved before the operation, is available in large quantities and is rarely ejected as a foreign body.

6. Saddle nose of first and second degree may be reconstructed by the use of alar, auricular or septal cartilage.

7. Saddle nose of third degree requires the addition of some outside substance, preferably ivory.

8. A two stage operation is preferable. In the first stage the tip and bridge are narrowed, and in the second the implant is inserted.

9. In cases in which only one defect is being repaired the columellar incision is most practical. If other work is being done on the nose an intranasal incision proves more advantageous.

10. Ivory implants quickly become surrounded by a fibrous capsule. If, as happens in rare cases, the ivory is infected and expelled, a cartilage graft may still be made. The fibrous capsule will aid the implantation of the cartilage.

11. Sodium amytal may be used with a local anesthetic, or avertin (with or without ether) may be employed. For a simple ivory implant when no other surgical work is being done N-methyl-cyclohexenyl barbituric acid may be used.

1075 Park Avenue.

ABSORPTION FROM THE MIDDLE EAR

ELLISON L. ROSS, M.D., PH.D.
AND
RULON W. RAWSON
CHICAGO

Normally the middle ear is closed externally and is rather remotely open to the posterior part of the nasal cavity. Rarely does any substance enter the middle ear. In cases of infection, one has the best chance to observe absorption from that area. The rapid rise of temperature to a high level, especially in children, is the result of absorbed toxic substances. The development of leukocytosis and general malaise is caused by the same process.

The diameter of the tympanic cavity of an adult is approximately 15 mm. The area of absorption is therefore small. The depth of this cavity is from 2 to 6 mm., limiting the capacity of the middle ear to about 1 cc.

Because of the difficulties involved in making observations on man, it was considered worth while to study the absorption of toxic substances from the middle ear of animals.

EXPERIMENTAL WORK

Dogs were used as subjects. They were anesthetized with ether, and an apparatus was connected for recording blood pressure, heart rate and respiration. The top of the head was kept flat on the operating board except for a slight tip away from the ear into which the drug was to be injected. Through an aural speculum a long, blunt syringe needle was used to puncture the drum several times. Then from 1 to 2 cc. of solution was injected into the middle ear. The head of the animal was carefully held in position so that the fluid would not escape either by way of the eustachian tube or from the external canal. Kymographic records of the changes induced were obtained.

Table 1 indicates the changes in blood pressure induced by the injection of nicotine, sodium nitrite and histamine.

The first injections of nicotine produced maximum changes in blood pressure in from 36 to 78 seconds. The effects of the second injections were considerably slower in appearance, in one animal requiring 1250 seconds. The average time required for the six injections to produce the maximum change was 275.83 seconds. A definite rise of blood pressure was induced in every case, the amount varying from 46 to 88 mm. of mercury, with an average of 67.33 mm. Stated in whole numbers, the rise of blood pressure of 56 per cent was produced in less than 5 minutes.

From the Departments of Otolaryngology, Physiology and Pharmacology, Northwestern University Medical School.

Sodium nitrite caused the maximum effect from 290 to 780 seconds, averaging 448 seconds. In every case this drug produced a decided drop of blood pressure. The average change amounted to 19.8 mm. Roughly stated, sodium nitrite produced a fall of 17 per cent in blood pressure in 7.5 minutes.

Histamine in the middle ear produced the maximum drop in blood pressure in from 80 to 270 seconds, or an average of 180 seconds. A significant change of blood pressure occurred in each animal. In approximate figures, histamine reduced the blood pressure 12 per cent in 2 minutes.

Evidences of absorption were obtained in animals on which no operation was performed after drugs were introduced into the middle ear by our method. A 5 per cent solution of atropine produced vomiting in about 50 minutes, with excitement and dilated pupils.

TABLE 1.—*Changes in Blood Pressure Caused by Absorption from the Middle Ear*

Substance	Dog	Injection	Time of Maximum Change, Seconds	Blood Pressure		
				Before Injection, Mm.	After Injection, Mm.	Difference, Mm.
Nicotine (chemically pure)	1	First	78	140	186	+46
		Second	27	142	230	+88
	2	First	54	94	166	+72
		Second	210	68	152	+84
	3	First	36	146	212	+66
		Second	1,250	130	178	+48
Average			275.83	120.00	187.33	67.33
Sodium nitrite 25%	1	First	290	94	86	— 8
		Second	240	88	81	— 7
	2	First	780	120	94	—26
		Second	560	90	64	—26
	3		370	196	164	—32
Average			448	117.6	97.8	—19.8
Histamine 5%	1	First	270	135	118	—17
	2	First	80	108	96	—12
	3	First	230	134	118	—16
	4	First	140	160	138	—22
Average			180	134.25	117.50	—16.75

Pilocarpine hydrochloride in a 2.5 per cent solution produced copious salivation and excitement for over 3 hours.

Strychnine in a 2.5 per cent solution induced convulsions and death in one dog in 12 minutes and death in another dog in 17 minutes.

In 1908 Van Rossem [1] applied cocaine in the middle ear and produced anesthesia of the vestibular apparatus. His work followed the investigation of Konig [2] and Gaglio,[3] who injected cocaine through the foremen rotunda to anes-

1. Van Rossem, A.: Onderzoek. ged. in het physiol. Lab. d. Utrecht. Hoogesch. **9**:151, 1908.

2. Konig, C. J.: Contribution à l'étude expérimentale des canaux sémicirculaires, Thèse de Paris, 1897; quoted by Camis, M.: Physiology of Vestibular Apparatus, New York, Oxford University Press, 1930.

3. Gaglio, G.: Esperienze sulla anesthesia dei canali semicircolari dell arecchio, Arch. per la sc. med. **23**:41, 1899; quoted by Camis, M.: Physiology of Vestibular Apparatus, New York, Oxford University Press, 1930.

thetize the vestibular apparatus. Later Magnus [4] paralyzed the vestibular apparatus temporarily by injecting a 20 per cent solution of cocaine through the bulla into the labyrinth. Hans Rhese [5] claimed that quinine taken orally reduces vertigo by paralyzing the vestibular apparatus.

Table 2 shows the effect on the vestibular reactions when various compounds were injected through the drum into the middle ear.

TABLE 2.—*Vestibular Effects of Compounds in the Middle Ear*

Drug	Dog	Time of Development, Minutes	Period of Ocular Nystagmus, Minutes	Period of Nystagmus of the Head, Minutes	Direction of Nystagmus	Direction of Tilt of Head	Direction of Falling	Direction of Turning
Cocaine 4%	1	25	175	0	Opp.	Same	Same	Same
	2	0	255	120	Opp.	Same	Same	Same
	3	5	135	0	Opp.	Same	Same	Same
Average		10	155	40	Opp.	Same	Same	Same
Procaine hydrochloride 10%	1	0	130	..	Opp.	Same	Same	Same
	2	0	165	..	Opp.	Same	Same	Same
	3	0	147	45	Opp.	Same	Same	Same
	4	0	164	105	Opp.	Same	Same	Same
	5	5	140	..	Opp.	Same	Same	Same
Average		1	145.2	30	Opp.	Same	Same	Same
5% Quinine bisulphate	1	65	195	0	Opp.	.....	.....	.....
	2	45	110	0	Opp.	.....	.....	.....
	3	0	325	20	Opp.	Same	.....	.....
Average		36.6	210	6.66	Opp.	.....	.....	.....
Ethyl alcohol 50%	1	0	50	..	Opp.	Same	.....	Same
	2	0	77	..	Opp.	Same	Same	.....
	3	0	30	..	Opp.	Same	Same	Same
	4	0	45	..	Opp.	.....	.....	.....
Average		0	40.2	..	Opp.	Same	Same	Same
Methyl alcohol 50%	1	0	142	75	Opp.	Same	.....	Same
	2	0	130	75	Opp.	Same	.....	Same
	3	0	127	90	Opp.	Same	Same	.....
Average		0	133	80	Opp.	Same	.....	.....
Hydrochloric acid 3%	1	75	180	0	Opp.	.....	.....	.....
	2	100	200	0	Opp.	Same	.....	.....
	3	195	360	0	Opp.	.....	.....	.....
Average		123.33	246.6	0	Opp.	.....	.....	.....
Sodium chloride 10% Temp. 25 C.	1	0	80	0	Same	.....	.....	.....
	2	5	65	0	Same	.....	.....	.....
	3	0	120	0	Same	.....	.....	.....
	4	0	60	0	Same	.....	.....	.....
Average		1.25	81.25	0	Same	.....	.....	.....
Sodium hydroxide	1	No reaction						
	2	No reaction						

Cocaine, procaine, ethyl alcohol, methyl alcohol, quinine and hydrochloric acid produced active nystagmus away from the ear into which the preparations were injected and a disturbance of equilibrium such as occurs when that ear is destroyed. A comparison of the effectiveness of the several substances cannot be made from the present data because of the variable dosage.

4. Magnus, R.: Arch. f. d. ges. Physiol. **47**:403, 1912.

5. Bettie, A.; von Bergmann, C.; Embden, C., and Ellinger, A.: Handbuch der normalen und pathologischen Physiologie, Berlin, Julius Springer, 1926, vol. 2, p. 731.

Salt in a 10 per cent solution produced active nystagmus toward the ear, which continued from 1 to 2 hours. This result can be interpreted only as evidence that salt stimulated the endings of the vestibular nerve.

Sodium hydroxide in a 3 per cent solution, atropine sulphate in a 5 per cent solution and pilocarpine hydrochloride in a 2.5 per cent solution did not produce spontaneous nystagmus or other evidence of vestibular disturbance.

COMMENT

This work was begun with the intention of studying the vestibular changes when cocaine and other compounds were applied to the middle ear. Before we evaluated the local effect of the substances it was necessary to determine how much general effect was possible from absorption into the blood stream. It has been shown earlier that absorption from the middle ear is rapid. The time required to produce reaction of the blood pressure and respiration varied from 3 to 6 minutes. Therefore, it is not surprising that otitis media produces toxemia evidenced by fever, prostration, nervousness, lack of appetite and sleeplessness. It is self-evident that these conditions with an unperforated ear drum would result in the rapid absorption of approximately 100 per cent of the toxic material.

The endings of the vestibular nerve are so well removed from the middle ear that it is surprising that a chemical substance is capable of penetrating through that space. The ampullae are separated from the middle ear, mostly by solid bone, partially by perilymph and endolymph and in a very small area by the membranes in the oval and round windows. There are three possible ways for a substance to travel from the middle ear to the ampullae of the vestibular nerve. The blood may carry it; the lymphatic vessels may do it. Physical osmosis through the tiny windows into the endolymph and perilymph and thence to the nerve endings is possible. Since it has been demonstrated that absorption into the blood stream is rapid and quickly produces general changes, it does not seem possible that when once in the blood stream the toxic substance would accumulate at the vestibular nerve endings in sufficient concentration to produce any effect. There are so few facts relative to the possibilities of osmotic and lymphatic transportation in the ear that it is useless to make speculations. The substances are transmitted, but the amounts must be minute. The capacity of the middle ear is small; the absorption of blood is great. Therefore, little is left to affect the nerve endings.

SUMMARY

Nicotine injected into the middle ear produced a maximum rise of blood pressure of 56 per cent in less than 5 minutes.

Sodium nitrite (25 per cent solution) produced a fall of blood pressure of 17 per cent in 7.5 minutes.

Histamine (5 per cent solution) reduced the blood pressure 12 per cent in 2 minutes.

Strychnine (2.5 per cent solution) caused death in anesthetized dogs in from twelve to eighteen minutes.

Pilocarpine hydrochloride (2.5 per cent solution) and atropine (5 per cent solution) produced marked systemic effects in approximately half an hour.

Vestibular paralysis of marked degree was produced by a 4 per cent solution of cocaine, a 10 per cent solution of procaine hydrochloride, a 5 per cent solution of quinine bisulphate, a 50 per cent solution of ethyl alcohol, a 50 per cent solution of methyl alcohol and a 3 per cent solution of hydrochloric acid. A 10 per cent solution of sodium chloride stimulated the labyrinth of the ear to which it was applied.

TRACHEOTOMY FOR THE RELIEF OF LARYNGEAL OBSTRUCTION IN CHILDREN

HERMAN E. KULLY, M.D.
OMAHA

During the period from Sept. 1, 1932, to Jan. 1, 1935, thirty-one children with alleged laryngeal obstruction were treated. In four of these the obstruction was not of sufficient severity to require surgical intervention. The remaining children presented a serious symptom complex which required emergency relief. Of this number two (6 per cent) died. One child, aged 9 months, died of diffuse bronchopneumonia on the tenth day following tracheotomy. The other death occurred in a child 8 years of age with diphtheria and scarlet fever who had no medical attention for twelve days. Death resulted from severe toxemia thirty-six hours following tracheotomy.

In this series twenty-two of the cases were of diphtheritic and nine of nondiphtheritic origin. There were more boys (64 per cent) than girls (36 per cent). Eighteen patients (58 per cent) were under 5 years of age; seven (22 per cent) were under 3 years of age. The period of greatest susceptibility, therefore, was between the ages of 3 and 6. The youngest in the group, a child who required a tracheotomy following the removal of a foreign body from the bronchus of a lower lobe, was 8 months of age. The youngest patient with diphtheritic laryngitis was a child 13 months old. Twenty-two of the cases were observed during the months of November, December, January and February, with the remaining cases distributed almost equally among the other months.

Twenty-five tracheotomies and two intubations were performed. Decannulation was accomplished before the seventh day in twenty-four cases; one patient required nine days, and one patient, who had a tracheotomy following the removal of a foreign body from the periphery of the lung, wore the tube for nineteen days.

The etiology of acute laryngeal obstruction in children is varied. Most of the cases in this series were observed at the City Contagious Disease Hospital and were of diphtheritic origin. Inflammatory edema associated with the ordinary acute infections of the upper respiratory tract may be an etiologic factor, and in association with general diseases, such as measles, scarlatina, typhoid, pneumonia, smallpox and pertussis, the acute laryngitis and edema may be due to specific organ-

From the Department of Oto-Laryngology, Creighton University College of Medicine.

isms. The presence of inspissated secretions may be the cause of the obstruction. A foreign body or the trauma incident to the removal of a foreign body or bronchoscopic examination for whatever cause may be a source of mechanical irritation with subsequent obstruction. Edema may be induced by the inhalation of boiling steam and liquids or by the drinking of scalding or corrosive fluids. Tuberculosis and syphilis should also be considered, although the onset of the obstruction in these cases is usually gradual.

It is a serious reflection on present-day medical education that the cause of the disease has become paramount, while the treatment has been relegated to a textbook on therapeutics or perhaps to a compend issued by a pharmaceutical company. Dyspnea is a serious condition, especially in children and young infants, and should be relieved early regardless of the cause. Watchful waiting in instances of exhaustive dyspnea is considered conservative treatment, though actually such a procedure is extremely radical. Dyspnea in a child early leads to physical and cardiac exhaustion which may cause death before the obstruction is relieved by cannulation. Mechanical obstruction rather than toxemia is of greatest importance in most instances, and decrease in mortality depends on active measures to improve it. One should be mindful of Dr. Chevalier Jackson's [1] dictum: "We always preach early tracheotomy, but practically always do it late, dangerously late."

No vital syndrome is more easily recognized or so frequently overlooked as acute laryngeal obstruction. It has become the practice of too many physicians to designate such conditions as croup. Greater diligence should be exercised in the early precise differentiation of that group of conditions designated as croup. Laryngeal obstruction is recognized by the distinct effort that the patient makes to breathe. The cardinal signs are indrawing at the suprasternal notch, in the supraclavicular fossae, in the intercostal spaces and at the epigastrium. There is an anxious facial expression, as though the patient is conscious of impending danger, noticeable even in a very young infant. Restlessness is always present and when caused by air hunger is an indication for surgical intervention. Restlessness usually increases to the point of exhaustion, when the child may become very quiet. This is an ill omen and is not to be interpreted as evidence of improvement in the child's condition. Cyanosis is a dangerously late symptom and may be entirely absent in children. When cyanosis appears the chances for life are very poor. One should never wait until the child becomes blue before relieving the obstruction.

There are three main methods for the relief of laryngeal obstruction: tracheotomy, intubation and the removal of secretions and membrane

1. Jackson, Chevalier, and Coates, George Morrison: The Nose, Throat, and Ear and Their Diseases, Philadelphia, W. B. Saunders Company, 1929.

in those cases in which the obstruction is of that nature. In answer to the question of which is the operation of choice, one is obliged to consider the varying circumstances of location of the patient, the skill of the attending physician and the training of the personnel in constant attendance, as well as the severity of the obstruction. The low mortality in this series, the absence of complications and the cosmetic result of a tracheotomy performed in a manner which will be outlined later are evidence of the superiority of this method for relief of laryngeal obstruction.

The immediate results of few surgical procedures are more gratifying than those following definitely indicated tracheotomy. As a therapeutic measure the place of tracheotomy has been definitely established. For many years tracheotomy was regarded by members of the medical

Fig. 1.—Tracheotomy was carried out on L. T., aged 6 years who had edema of the larynx for twelve hours following bronchoscopic removal of a peanut from the main bronchus of the left lung. Decannulation was accomplished on the fourth day.

profession with fear and trembling. The operation was first referred to by Galen and Arataeus, who lived during the second to the third century A. D.[2] The operation was originally known as laryngotomy and bronchotomy, and the word tracheotomy did not come into use until the early years of the nineteenth century. The first recorded successful tracheotomy was performed in 1546 by Antonio Musa Brasavola, an Italian physician. However, Asclepiades of Bythinia (124 B.C.) is credited with having performed a tracheotomy for the relief of angina. The first successful tracheotomy for diphtheria is credited to Bretonneau in 1825. The first child to have a tracheotomy was a boy 7 years of age

2. Goodall, E. W.: The Story of Tracheotomy, Brit. J. Child. Dis. **31**:167 (July-Sept.) 1934.

who was operated on in 1766 by Caron for the relief of croup. It is appalling to think of the vast number of infants who must have fallen victim to laryngeal obstruction from the era of Hippocrates well on to the nineteenth century.

Though tracheotomy is one of the oldest operations in surgery, it is the one most frequently done improperly and the one most often mismanaged in the after-care. The complications of a tracheotomy properly performed are rare. There are no contraindications to tracheotomy for the relief of dyspnea. The technic which I employ both in private practice and in the care of the children at the hospital for contagious diseases emphasizes two features: The tracheotomy is always performed directly above the suprasternal notch, and the incision of the skin never exceeds from 2 to 3 cm. in length. The advantages of

Fig. 2.—An emergency tracheotomy was performed without anesthesia on J. H., aged 3 years, with laryngeal diphtheria. Dyspnea had been present for twenty-four hours, and there was cyanosis. Decannulation was possible on the fifth day.

a short incision in this position are obvious. Primarily, necessity forces the operator to perform a low tracheotomy, which thus obviates the hazards of injury to the cricoid cartilage and the danger of irritation of the subglottic space by a highly placed tracheotomy tube. A secondary, but important, reason is a good cosmetic result. It is admitted that tracheotomy is a life-saving procedure, but large unsightly scars on the neck may become the source of psychic disturbance to a sensitive person. The accompanying figures represent not selected cases but only those available at the present writing.

The patient is placed on the table in the manner described in the standard textbooks. Infiltration of the skin renders the operation pain-

less since the deeper structures have little sensation and do not require infiltration. A midline incision dividing the skin and fascia is made for a distance of from 2 to 3 cm., with the lower end just above the suprasternal notch. Hemostats are placed on the cut edges of the divided fascia and are allowed to fall over the side of the neck, one on each side. The ribbon muscles are separated by blunt dissection, and a hemostat is placed on the cut edge of each of these and is allowed to fall to the side of the neck. The principle of the weighted hemostats has numerous advantages: First, bleeding is reduced to a minimum, although the hemostats are not applied for this purpose. Second, the weight of the hemostats on each side of the neck affords ample retraction, giving a clearer view of the field through a small incision, obviating

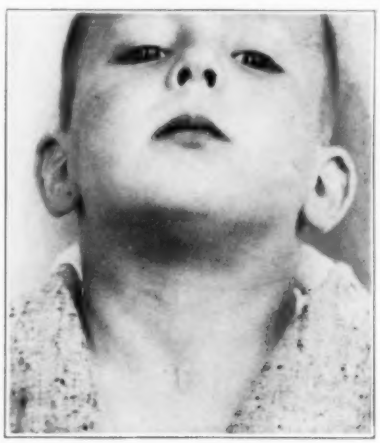

Fig. 3.—An emergency tracheotomy, with local anesthesia, was performed on R. H., aged 4 years, with laryngeal diphtheria and dyspnea for eighteen hours. Decannulation was possible on the fifth day.

the use of bulky retractors and making it possible for the physician to perform a careful tracheotomy without assistants. The most important advantage of this method results from the elevation of the trachea into the upper surface of the neck as each successive pair of hemostats is added to a deeper plane in the neck. The trachea, even though it lies at a deep level in this area of the neck, is thus raised to the surface and is readily incised through the fourth and fifth rings, the third being occasionally included. Skin sutures are not necessary. The entire procedure may be performed in a minimum of time, and it is the method that I employ in the case of even the most moribund patient. Most of the standard textbooks make a distinction between low and high tracheotomy. This teaching is erroneous. High tracheotomy may be

mentioned only to be condemned. The distinction is a relic of the day when surgeons had an undue amount of respect for the thyroid gland and isthmus. Jackson [3] has found high tracheotomy responsible for five sixths of the cases of chronic laryngeal stenosis.

The use of a general anesthetic is a most dangerous procedure. Any patient dyspneic enough to require a tracheotomy is depending largely on the action of the accessory respiratory muscles. When this action is stopped by beginning unconsciousness respiration ceases. Sedatives should not be administered because of their effect on an already exhausted respiratory center.

The anatomic relations of the larynx in children are different from those in adults.[4] The epiglottis is opposite the first cervical vertebra

Fig. 4.—An emergency operation without anesthesia was performed on B. T., aged 4 years, with laryngotracheal diphtheria. On admission she was cyanotic and moribund following an illness of twelve days during which no antitoxin was given. Aspiration of the membrane was carried out through the tracheotomy opening. Decannulation was possible on the seventh day.

during late fetal life and the first year of infancy. It descends the distance of two vertebrae between the first and the thirteenth year. The inferior margin of the cricoid cartilage is opposite the third vertebra at birth and descends to the level of the sixth cervical vertebra in the adult. In childhood the larynx is not only absolutely smaller than in the adult, but it is small in proportion to the development of other regions. The cartilages are softer and more yielding; the mucosa is less closely adherent to the subjacent tissues, and consequently effusion and stenosis take place more easily. The lymphatic supply of the mucosa is richer, and hence acute laryngitis is more apt to be attended with

3. Jackson, Chevalier: High Tracheotomy and Other Errors, the Chief Causes of Chronic Laryngeal Stenosis, Surg., Gynec. & Obst. **32**:392 (May) 1921.

4. Thomson, St. Clair: Diseases of the Nose and Throat, Comprising Affections of the Trachea and Oesophagus, New York, D. Appleton & Company, 1926.

submucous infiltration, especially in the subglottic area. The nervous system of the child is more unstable and appears to be particularly sensitive when the larynx is involved.

Intubation was resorted to in only two cases, partly because most of the patients were confined to the municipal hospital for contagious diseases, where no arrangements are made for the constant attendance of one experienced in the technic of intubation, but primarily because of the dangers attendant on this method of relief. An intubation tube, even though it may give quick relief, may come out at any time, and thus a new emergency is created, possibly more urgent than that previously encountered. There is no such danger associated with a tracheotomy tube. A diseased larynx should be put at rest. This cannot be accomplished with an intubation tube which constantly irritates an inflamed mucosa and too frequently results in ulceration with subsequent scarring. Especially is this the case when the intubation has to be repeated frequently. Stenosis of the larynx will never follow as a direct result of a tracheotomy properly performed. When the obstruction is due to the formation of membrane the advancing intubation tube may readily force membrane into the trachea and cause an obstruction which may present a serious problem and possibly death. An inexperienced operator might form a false passage with the intubation tube; two patients were seen in whom the tube had been passed in front of the epiglottis and was found lying under the skin when tracheotomy was resorted to. The intubation tube is not of great value when the obstructive process has extended into the trachea. In such cases a tracheal opening affords a most satisfactory method of removing membrane and secretions from the trachea by suction.

The third method of relief, by repeated use of suction through the laryngoscope or bronchoscope, seems to have little place in the treatment of laryngeal obstruction in children. Obviously aspiration cannot relieve obstruction resulting from edema of the subglottic space, the most common pathologic condition in children with obstructive dyspnea regardless of the etiologic factor. Any increased respiratory effort on the part of a patient suffering from marked obstructive dyspnea may precipitate laryngeal spasm with complete obstruction. This may be brought on by severe exhaustion associated with gagging during laryngeal examination.

Above all, clinical observation should teach one when operation is necessary. It is true that delay and carelessness on the part of the laity, especially in cases of diphtheria, may be responsible for the high mortality among children suffering from obstructive dyspnea, but no child should be allowed to die of mechanical laryngeal obstruction under the eye of any physician.

SUMMARY

A series of thirty-one cases of laryngeal obstruction in children is presented. Two patients (6 per cent) died.

The operation of choice for the relief of acute laryngeal obstruction in children is tracheotomy.

A plea is made for low tracheotomy performed through small incisions, thus preventing injury to the larynx and affording a good cosmetic result.

Clinical Notes

"REINFECTION OF THE WOUND FOLLOWING MASTOIDECTOMY"

Detailed Report of Case Previously Published

A. A. Schwartz, M.D., New York

In the Archives of Otolaryngology [1] for January 1935 a paper was published entitled "Reinfection of the Wound Following Mastoidectomy." The third case which was reported in that paper has given rise to discussion. I have claimed and still believe that this was a case of meningitis sympathica. Dr. Samuel J. Kopetzky believes that the case was one of acute suppurative meningitis with recovery. Because of the divergence of opinion, Dr. Kopetzky has requested that the history of the case be given in detail, and since there is so marked a controversy I believe that this should be done. The details were omitted in the original paper, as the object was not to report either meningitis or meningitis sympathica but to discuss reinfection after mastoidectomy.

In the present communication it is my intention not to argue the question but to give the various clinical details which were not mentioned in the previously published report.

The history of the patient before admission to the hospital on Feb. 4, 1934, was given in the original article. At the operation, performed by me on February 4, a plate of bone which separated the antrum from the mastoid cavity was found to be eroded, and a large opening was present. This opening was slightly enlarged. The culture of the pus from the mastoid wound showed Streptococcus pyogenes-haemolyticus.

Between February 4 and 9 the child was extremely restless and irritable and complained frequently of chilly sensations and pains in the back part of the head. There were frequent generalized headaches, so severe that the child cried with pain and tossed about.

The temperature on February 5 rose to 104 F. and then ranged between 99.2 and 102 F. until February 9, when it rose suddenly to 104.6 F.

On February 7 a slight swelling of the right side of the face was noted. On February 8 purulent otitis media developed in the left ear.

The roentgenologist's report of the condition of the mastoids is as follows: "Right side: There is an extensive defect due to previous operation. Left side: There is a cluster of cells posterior to sinus groove in which areation is diminished. The intercellular structures are partially calcified. There are also a few cells in the tip. The cellular structure projected anterior to the sinus groove in each mastoid is probably due to cells in the petrous pyramid. There is apparently partial decalcification of each petrous apex."

Neurologic examination revealed no abnormality. The Babinski, Kernig and Oppenheim signs were not elicited, and there was no ankle clonus or rigidity of the

1. Schwartz, Alfred A.: Arch. Otolaryng. **21**:71 (Jan.) 1935.

neck. The fundi were normal. The headaches were severe and were suggestive of an abscess of the brain.

On February 9 the child was more restless and noisy and complained of severe headache and pain in the right ear. She appeared weak and exhausted and was unable to find a comfortable position. In the afternoon the temperature rose suddenly to 104.6 F., and the child complained of slight dizziness. Neurologic examination revealed no abnormality except a slight facial palsy, which was noted by Dr. Kopetzky. Lumbar puncture was performed and almost immediately relieved the headaches. The child slept fairly well through the night.

On February 10 an examination by Dr. Emil Altman showed the following conditions: "Peripheral paralysis on the right side of the face; markedly diminished left knee jerk; slight clonus on both sides; a bilateral Babinski sign; markedly diminished abdominal reflexes; a moderate bilateral Kernig sign; rigidity of the neck; equal pupils reacting promptly to light and in accommodation."

The patient was drowsy all day. The headaches were completely relieved after lumbar puncture on February 9. The signs of meningeal involvement were increasing and seemed to me to indicate rupture of an abscess of the brain. There was a slight discharge from the left ear. The child ate fairly well, and there was no nausea or vomiting.

The patient was seen by Dr. Kopetzky, and his note reads as follows: "I believe we are dealing with the first phase of general meningitis. I recommend complete internal decompression, lumbar puncture daily and transfusion of from 50 to 75 cc. of blood every two or three days."

The recommended operation was immediately performed by Dr. Kopetzky. The sinus was exposed and appeared to be normal. The dura was exposed and was found to be bulging into the cavity. The dural plate was completely removed through Trautmann's triangle and over the sinus, the dura and sinus being completely uncovered. The mastoid was converted into a radical cavity. A few granulations were found near the antrum. The bone which was removed was solid and did not appear to be diseased. No pus was found in the mastoid cavity.

Urinalyses on February 6 and 10 showed a faint trace of albumin; otherwise they showed negative results.

The blood counts showed the following values:

Date	Erythrocytes	Hemoglobin, Percentage	Leukocytes	Polymorphonuclears, Percentage	Monocytes, Percentage	Staff Cells, Percentage
Feb. 6	4,280,000	80	14,200	82	18	2
Feb. 8	4,190,000	76	11,000	85	15	3
Feb. 9	4,310,000	80	17,000	83	17	3

A blood culture made on February 9 was sterile. Examination of the spinal fluid showed: appearance, clear; pellicle, present; albumin, 2 plus; globulin, 1 plus; reduction of copper, 1 plus; cells, 970 per cubic millimeter; polymorphonuclears, 88 per cent; monocytes, 12 per cent; smear, negative for organisms, and culture, contaminated.

Between February 10 and 16 the temperature was irregular, rising to 103 or 104 F. each day. On February 14 it dropped to 99.6 but quickly rose to 103 F. The pulse rate ranged between 90 and 110, and the respiratory rate was about 28.

On the day after operation the rigidity of the neck was much less marked. Kernig and Babinski signs were still present, especially on the right side. The facial palsy was markedly improved. All the neurologic signs were diminished. The patient was restless and tossed about. She took little nourishment.

Early in the morning of February 12 the child appeared to be markedly improved. Later in the day Dr. Altman examined the child and reported: "There

is marked headache. Ankle clonus is more sustained on the left than on the right and more so than on last examination. The paralysis on the right side of the face is much improved. A Kernig sign is present on the right side." Dr. Kopetzky examined the child in the afternoon and reported: "The general condition is the same as it was yesterday, the patient is somewhat stimulated and excitable. I advise blood transfusion, but no spinal tap now."

On February 13 the child complained of pains in the back of the neck and head and of frontal headaches. She appeared drowsy. Lumbar puncture was performed, and afterward the child was more comfortable. The pain and headache were relieved.

On February 14 she complained of headaches and chilly sensations. Lumbar puncture was done, 10 cc. of cloudy fluid being removed. Following this she was active and playful and slept well.

On February 15 she complained of headaches and chilly sensations in the early morning. Later she complained of dizziness and was uncomfortable and irritable. There was a slight discharge from the left ear.

The neck was less rigid. All neurologic symptoms were subsiding. Mentally she was clear and cooperative. Her general condition seemed to be improving.

The blood counts between these dates were as follows:

Date	Erythrocytes	Hemoglobin, Percentage	Leukocytes	Polymorphonuclears, Percentage	Monocytes, Percentage	Staff Cells, Percentage
Feb. 12	3,950,000	75	10,700	89	11	8
Feb. 13	4,000,000	80	16,200	73	27	5
Feb. 15	3,920,000	77	14,900	87	13	5

A blood culture, made on February 11, was sterile. Examination of the cerebrospinal fluid gave the following results:

Date	Appearance	Albumin	Globulin	Reduction of Copper	Cells	Polymorphonuclears	Culture
Feb. 13	Slight clouding	2 plus	2 plus	Trace (decreased)	1,100	Majority	No micro-organisms
Feb. 14	Slight clouding	2 plus	2 plus	Trace	1,130	Majority	Staphylococci (?)

Three transfusions were given as follows: February 10, 100 cc.; February 12, 50 cc., and February 14, 100 cc.

On February 16, twelve days after the postauricular incision and six days after the decompression operation, the child's condition suddenly became worse. The temperature rose to 104.6 F. She was extremely irritable, complained of dizziness, was restless when asleep and complained of severe frontal headache. The pulse rate was irregular, and at times she appeared cyanotic.

Dr. Kopetzky noted a marked nystagmus to the left, which was nonrotatory and lasted for about five minutes after a rapid change in position. During this period of nystagmus, there was consciousness of vertigo. He regarded this as a sign of paralabyrinthine involvement.

At times the child complained of diplopia. When lying on the left side she was comfortable and did not wish to turn. The nystagmus was not constant but came on mainly when the patient was turned suddenly. There was a slight discharge from the left ear.

On February 17 the symptoms continued, the temperature rising to 105 F. This high elevation between February 16 and 17 was continuous for nearly twenty-four hours, and then the temperature dropped to 102 F. The child appeared exhausted and drowsy but responded when spoken to. After lumbar puncture she rested

quietly. Later in the afternoon a transfusion was given. Through the evening and night she did not complain of headaches. She slept the greater part of the night.

The blood counts were as follows:

Date	Erythrocytes	Hemoglobin, Percentage	Leukocytes	Polymorphonuclears, Percentage	Monocytes, Percentage	Staff Cells, Percentage
Feb. 16	3,960,000	76	11,900	86	14	2
Feb. 17	3,840,000	70	22,600	90	10	6

Examination of the cerebrospinal fluid gave the following results:

Date	Appearance	Albumin	Globulin	Reduction of Copper	Cells	Polymorphonuclears, Percentage	Monocytes, Percentage
Feb. 16	Cloudy	2 plus	2 plus	0	220	70	30
Feb. 17	Cloudy	2 plus	2 plus	0	1,600	75	25

Culture of the cerebrospinal fluid on February 16 showed the presence of Streptococcus haemolyticus. A direct smear from the culture showed streptococci, occasionally in chains. For February 17 there are two reports of cultures. One report states that there was no growth on culture but that streptococci were found on direct smear. The second report states that streptococci were found occasionally on culture.

On February 18 the temperature dropped to 101 and then to 100 F., and in twenty-four hours it was normal. The patient was seen by Dr. E. D. Friedman, who noted a mild weakness of the external rectus muscles which was more pronounced on the right side, a residual facial paresis on the right side and a tendency to ankle clonus on the left side. A mild Kernig sign was present, and there was rigidity of the neck. He advised an expectant regimen.

On February 20, examination of the spinal fluid gave the following results: appearance, slightly cloudy; albumin, 1 plus; reduction of copper, faint; cells, 560, and culture, negative.

After February 20 spinal puncture was no longer performed. A blood transfusion of 50 cc. was given on that day.

The temperature remained normal until March 6, when there was a rise to 102 and 103 F. following suture of the mastoid wound. The temperature rapidly dropped to normal, and the patient was discharged on March 12. She has been well since then.

7 West Seventy-First Street.

POLYPI OF THE NASAL SEPTUM

NORA B. BRANDENBURG, M.D., CHICAGO

Multiple areas of circumscribed polypoid degeneration of the mucous membrane of the nasal septum are unusual. The case which I report is of particular interest because of the presence of polypoid masses on the septum associated with numerous mucous polypi springing from the ethmoid sinus, and of similar but not quite the same formation as the mucous polypi in the meatus.

REPORT OF A CASE

S. K., a Polish laborer, aged 52, complained of cough, headaches, visual disturbances with pain over the right eye, and inability to breathe through the nose.

From the Department of Otolaryngology, Division of Central Free Dispensary, Rush Medical College.

He stated that the onset of symptoms followed a severe cold and sinus infection twelve years before, with gradual onset of asthma and productive cough.

On examination there was slight tenderness over the fronto-ethmoidal areas. There was slight lagophthalmos of the upper lids. Large gray polypi, bathed in purulent secretion, protruded from both nares. The upper jaw was edentulous. There were four teeth in the lower jaw with marked retraction and infection of the gums. The throat was red and injected. Pus was expressed from the tonsils. Because of the choked condition of the nasal cavities it was impossible to examine the passages until some of the polypi were removed. Posterior rhinoscopy revealed a large pedunculated polyp completely filling the nasopharynx. On transillumination the sinuses were uniformly dark. Five large polypi were removed. As the nasal

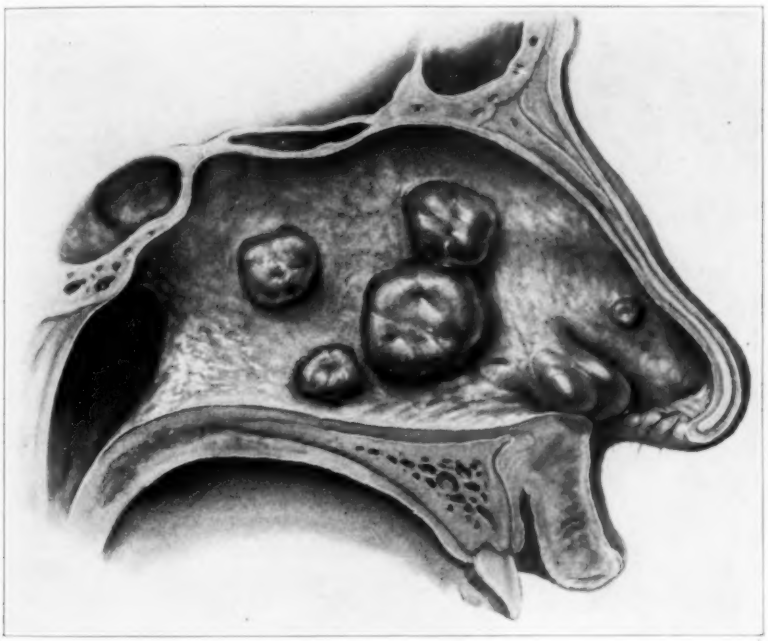

Fig. 1.—Polypi of the nasal septum as observed by the artist on examination with a speculum.

cavities were cleared it was noted that the polyposis involved the nasal septum as well as the middle turbinate and middle meatus.

This polyposis was present on both sides of the septum. The individual masses were of sizes varying from one-eighth to one-half inch (0.32 to 1.27 cm.) in diameter. The projections were of a sessile type, not pedunculated like the other polypi, and were elevated above the surface. They varied in shape, some being round and some oblong, and were slightly lobulated. The growths were of a soft texture and were flatly attached to the septum (fig. 1). As a deflection of the nasal septum obstructed the drainage of the right anterior ethmoid cells a submucous resection was performed.

The microscopic sections showed a formation which could be described as myxomatous. A typical section is illustrated in figure 2. The tissue was covered with ciliated columnar epithelium. The subepithelial stroma appeared as a homo-

geneous mucoid substance in which were embedded a variable number of fine fusiform and stellate cells. These stroma cells were very scanty and formed the sole framework of the tumor, holding a few round cells in their meshes. Under low power magnification portions of the section revealed numerous mucous glands with marked cellular infiltration about the basal membrane. The lumens contained mucus and frequently polymorphonuclear leukocytes. The cells in the myxomatous tissue often formed focal accumulations about the glands and blood vessels. Monocytes predominated over polymorphonuclears. Plasma cells, lymphocytes and histiocytes occurred in considerable numbers. The polymorphonuclear leukocytes were

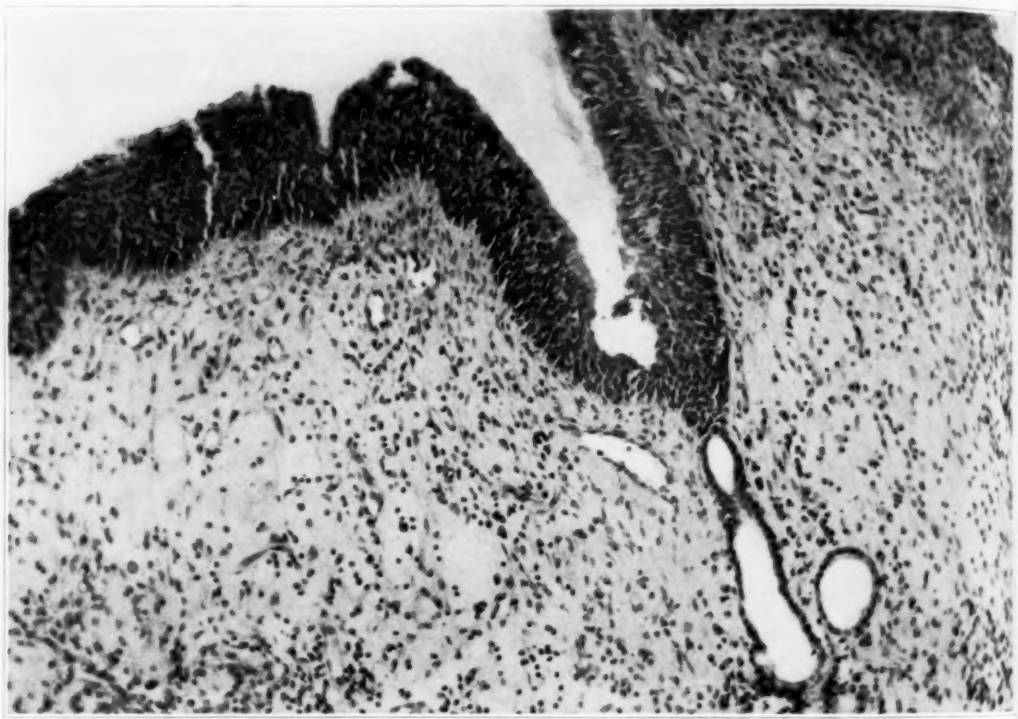

Fig. 2.—Photomicrograph of a polyp removed from the nasal septum.

about equally neutrophilic and eosinophilic. Capillaries and small blood vessels were numerous; the walls were thin; the endothelium was frequently swollen. The epithelium was stratified and columnar and revealed many polymorphonuclear leukocytes migrating between the tall cells. The appearance was that of a myxomatous polyp, fairly glandular, associated with chronic inflammation. The eosinophils pointed to a possible allergic basis.

The presence of polypi of the nasal septum in this patient may be explained by the fact that the secretions were forced on the septum by the obstructing mass of polypi growing from the usual location. This finding agrees with the prevailing belief that polypi originate in areas bathed by irritating discharges. Furthermore, on removal of these polypi there was no evidence of a submucous inflammatory disturbance of the structures of the septum, and on submucous resection the septal

structures appeared normal. This emphasizes the teaching of Hajek [1] that it is not essential that submucous disease should be present as an etiologic factor in the development of the polypoid degeneration. Zuckerkandl [2] remarked that in no single case had he found carious or necrotic involvement of the bone. Faulkner [3] stated: "Polypi are usually found associated with an ethmoiditis. They are of inflammatory origin rather than a new growth, and are produced by degenerative changes in the mucous membrane, the result of a chronic irritant. They are most frequently associated with a condition of the ethmoid labyrinth in which the bony walls of the cells are carious. Whether this condition of the bone is a cause or result of the polypi has been much discussed, but the most general belief today is that there is a carious bone as a preliminary change to the formation of polypi." Phillips [4] remarked, "Nasal polypi are grayish or pink in color and usually spring from the middle turbinate, ethmoid, or more rarely protrude from the infundibulum, the sphenoid ostium or maxillary ostium. In rare instances they are attached to the inferior turbinate or the nasal septum." Thomson [5] expressed the belief that mucous polypi never grow from the roof or floor of the nose, and rarely from the septum or inferior turbinate. Ballenger,[6] however, stated that a polypus arising from the septum is an angioma, a fibroma or a granuloma. Possow and Glos [7] both stated that polypus of the septum is a tumorlike formation which develops on an inflammatory base. Schreyer [7] examined thirteen polypi of the nasal septum in the clinic in Breslau and came to the conclusion that they were abnormally proliferating angiomas.

SUMMARY

1. A case of myxomatous polypi originating from the nasal septum is reported.

2. These polypi were associated with similar pedunculated polypi arising from the middle meatus.

1. Hajek, M.: Pathologie und Therapie der entzündlichen Erkrankungen der Nebenhöhlen der Nase, ed. 5, translated by Joseph D. Heitger and F. Hansel, St. Louis, C. V. Mosby Company, 1926, vol. 2, p. 436.

2. Zuckerkandl: Etiology of Mucous Polypi of the Nose, Brit. M. J. **2**:477 (Aug. 24) 1895.

3. Faulkner, E. R., in Jackson, C., and Coates, G. M.: The Nose, Throat and Ear and Their Diseases, Philadelphia, W. B. Saunders Company, 1929, pt. 1, p. 88.

4. Phillips, Wendell C.: Diseases of the Ear, Nose, and Throat, Medical and Surgical, ed. 7, Philadelphia, F. A. Davis Co., 1928, chap. 17, p. 684.

5. Thomson, St. Clair: Diseases of the Nose and Throat, ed. 3, New York, D. Appleton & Company, 1931, p. 235.

6. Ballenger, W. L.: Diseases of the Nose, Throat and Ear, Medical and Surgical, ed. 6, Philadelphia, Lea & Febiger, 1930, p. 685.

7. Quoted by Ballenger.

SUBCUTANEOUS EMPHYSEMA FOLLOWING TONSILLECTOMY

Report of Two Cases

PAUL B. MACCREADY, M.D., NEW HAVEN, CONN.

Subcutaneous emphysema following tonsillectomy is not uncommon, though relatively few reports of its occurrence have appeared in the literature. It is

From the Department of Surgery, Yale University School of Medicine.

not a serious complication but is apt to be disconcerting to the surgeon, and its prevention should be possible in most instances. For this reason the following two cases which occurred in my experience may be of enough interest to record.

REPORT OF CASES

CASE 1.—J. K., a stockily built man of German extraction, aged 65, was referred to me because of a chronic degenerative macular change in the retina of obscure origin. The patient had been under the care of a physician for five years for the relief of primary anemia. For the past four years he had eaten ½ pound (226.88 Gm.) of raw liver every day, which apparently had controlled the primary anemia. The results of examination were essentially negative except for the laboratory findings, which still showed the existence of primary anemia. The examination of the head revealed nothing remarkable except in the pharynx, which was stained yellowish red, presumably as the result of chewing of tobacco. The tonsils were moderately large; the anterior pillars were hyperemic, and pus was definitely expressed from the tonsillar crypts by pressure. The pus showed numerous leukocytes on examination. It was believed that the tonsils were acting as a focus of infection for the production of the ocular condition, and operation was advised.

A tonsillectomy was done under local anesthesia. The whole area surrounding the tonsil was infiltrated with a 1 per cent solution of procaine hydrochloride. This was done by making four injections outside the tonsillar capsule. The tonsils were dissected out, and there was no special bleeding or difficulty during the operation. The patient was returned to his room. Less than one hour after the operation I was called to see him because of a large swelling which had appeared under the left eye. He was coughing hard and appeared apprehensive. It was stated that after a severe attack of coughing the swelling had suddenly appeared under the left eye. Examination showed fulness of the left side of the neck and of the left cheek and marked puffiness just beneath the eye. The whole area produced a marked crackling on palpation. Examination of the pharynx showed no abnormality. There was no edema or evidence of emphysema in the pharynx. The left tonsillar fossa appeared about the same as it did when the patient left the operating room. He was given a sedative and admonished not to cough. No further treatment was given. Within twenty-four hours most of the swelling had disappeared, and within forty-eight hours all of it had disappeared.

CASE 2.—G. I. T., a rather obese white woman, aged 43, had complained of sick headaches. She had been treated by her physician for several years for the relief of migraine. Adherence to diet and other forms of treatment gave no relief. It was noticed that each time the patient had a sore throat headache developed. Results of the examination of the head were entirely negative except for the tonsils and teeth. The tonsils were large, scarred and markedly adherent. The anterior pillars were hyperemic for a wide area. Pus could be extruded on pressure. It was believed that the patient was suffering from chronic tonsillitis, and it seemed advisable to remove the tonsils in order to at least improve the general physical condition. The results of the rest of the physical examination were entirely without importance, except that, as it should be noted, the patient had a short, thick neck. Because of her general nervousness it was decided that tonsillectomy should be done under general anesthesia. Ether anesthesia was given by means of the Sewall-Davis mouth gag. The tonsils were dissected out by

blunt dissection. There was a fair amount of bleeding, as one would expect in a patient with this type of condition, so catgut sutures were put in each fossa. There was nothing unusual about the operation. At the end of the operation, as a regular procedure, the patient was given inhalations of carbon dioxide and oxygen. Unfortunately, this was prolonged so that the patient went into a spasm and clenched her teeth tightly. There was a terrific expiratory effort. During the closure of the teeth a marked swelling suddenly developed around the left eye. The eye was completely closed by the swelling of the upper and lower lids. There was also swelling along the left side of the neck, which crackled on palpation. In order to prevent further respiratory difficulty, the mouth gag which had been removed for the induction of carbon dioxide was reinserted. Breathing then became normal. The patient made an uneventful recovery from the operation. The swelling beneath the eye was apparent for twenty-four hours, but it disappeared within forty-eight hours. Examination of the throat as soon as the mouth gag was reinserted showed no swelling around the tonsillar fossae, which appeared exactly as when the operation had been finished.

COMMENT

These two patients presented a similar picture in regard to the probable etiology of the subcutaneous emphysema, despite the fact that one was operated on under local and the other under general anesthesia. This factor was the tremendous intrathoracic pressure. In the first patient, operated on under local anesthesia, this occurred during a terrific spasm of coughing. In the second patient, operated on under general anesthesia, the increased intrathoracic pressure developed during a spasm in which the patient had clamped her teeth together so that there was a tremendous effort to breathe. The factor of explosive respiratory effort and the absence of evidence of subcutaneous emphysema about the pharynx or bubbles in the saliva lead one to believe that the emphysema was of alveolar origin, the result of tremendously increased intrathoracic pressure. The presence of emphysema in the neck likewise adds to the strength of this view.

Stevenson,[1] who summarized the cases reported prior to 1933, described a case in which the air apparently entered through the muscular fibers of the tonsillar fossa. He did not mention the occurrence of an explosive respiratory effort, but in other respects his case was similar to my second case. Dickson,[2] who reported one case, concluded from his review of the literature that subcutaneous emphysema following tonsillectomy occurs only with a general anesthesia. It is obvious from the two cases that I have described that the type of anesthesia used is not an etiologic factor. Emphysema is more likely to occur in the apoplectic person with a short, thick neck, who frequently causes considerable apprehension during a tonsillectomy because of respiratory difficulty. The complication is not serious and, fortunately, not especially common. These two cases are reported in an effort to point out the care which should be followed during and after every tonsillectomy done under general or local anesthesia, in order to prevent anything which would produce explosive respiratory effort and give rise to tremendously increased intrathoracic pressure.

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1. Stevenson, R. S.: Subcutaneous Emphysema Following Tonsillectomy, J. Laryng. & Otol. **48**:260, 1933.

2. Dickson, J. C.: Subcutaneous Emphysema Following Tonsillectomy, Ann. Otol., Rhin. & Laryng. **42**:1240, 1933.

A NASAL SUCTION TUBE

D. H. ANTHONY, M.D., MEMPHIS, TENN.

This instrument is useful for internal or external operations on the nose. The tube is smaller at the distal end, which prevents the tube from becoming clogged by chips of bone and blood clots as an ordinary tube often does. The end of the tube is smooth and bulbous. This instrument will fit the ordinary

Nasal suction tube.

rubber suction tube. The tube is bent at a convenient angle to prevent obstruction of the operator's view when used intranasally. The tube is 4½ inches (11.3 cm.) from the tip to the angle. The diameter is 5 mm. with a gradual tapering at the distal end to a 3 mm. opening. The total length of the tube is 10 inches (25.4 cm.). I have been using this tube for all my work on the nose for more than a year.

A NEW NASO-ANTROSTOMY FORCEPS

S. A. ALEXANDER, M.D., WASHINGTON, D. C.

The instruments now available for performing naso-antrostomy are difficult to introduce under the inferior turbinate bone without trauma. The instrument illus-

A new naso-antrostomy forceps.

trated here is small and is readily introduced through an opening made with a trocar. It does not injure the surrounding tissues, and it makes a clean bite.

In performing the operation, infraction of the turbinate bone is not necessary. The blade of entrance of the forceps is curved so as to conform to the curve of a Coakley antrum trocar, and it will easily enter the opening made by this instrument. If the opening obtained by antrostomy is not large enough, a larger biting forceps may be used to increase its size.

In cases of acute maxillary sinusitis in which frequent irrigations are sometimes indicated and in which traumatism is to be avoided, this instrument is especially applicable. The opening is most satisfactory when it is made near the floor of the nose. It usually closes in two or three weeks, leaving no evidence of the operation.

The instrument may be obtained from V. Mueller & Co., of Chicago.

CORRECTION

In the article by Dr. Samuel Salinger, entitled, "The Paranasal Sinuses," published in the August issue (ARCH. OTOLARYNG. **22**:188, 1935), "milligram hours" in the twelfth line on page 237 and "mg. hours" in the first line of the first new paragraph on the same page should read "gram hours."

Progress in Otolaryngology

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

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ACUTE AND CHRONIC OTITIS MEDIA, SINUS THROMBOSIS AND SUPPURATION OF THE PETROUS PYRAMID

SAMUEL J. KOPETZKY, M.D.

NEW YORK

THE ACUTE LESIONS

It would seem that by this time all the problems concerned with the fundamental anatomy of the temporal bone should have been worked out and comprehended. Yet during last year, Claus [1] published a detailed study of the anatomy based on an examination of 1,500 temporal bones. The normal and the abnormal bones are described and discussed in detail. It would take me too far afield to retell the author's findings or even to summarize them. The article should be read and studied in the original. Suffice it here to call attention to this newer report, particularly of interest to those who desire to correlate their own findings with those of this excellent study.

The exact location of a suppurative lesion within the tympanic cavity is always useful from the practical, bedside standpoint. Vahldieck's [2] treatise is therefore noteworthy. He substantiates prior observations made by Wittmaack and gives data useful in estimating the outcome of a case of otitic suppuration. Every one is becoming more exact in making prognostic estimations of the outcome of a given case of otitic suppuration. A factor in arriving at this decision is naturally a knowledge of the bony structure on which the lesion has developed. Another factor finds its expression in Vahldieck's report, in which he reiterates the value to be placed on the different forms of otitis which present themselves for observation. Thus, for example, retrotympanic suppuration usually becomes basically chronic. In an earlier publication I [3] called

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From the Department of Otolaryngology of the Beth Israel Hospital.

1. Claus, G.: Studien über das Os temporale und seine Umgebung, Ztschr. f. Hals-, Nasen- u. Ohrenh. **33**:515, 1933.

2. Vahldieck, W.: Ist die Unterscheidung in akute mesotympanale, epitympanale und retrotympanale Otitis media berechtigt? Arch. f. Ohren-, Nasen- u. Kehlkopfh. **137**:187, 1933.

3. Kopetzky, Samuel J.: Otologic Surgery, ed. 2, New York, Paul B. Hoeber, Inc., 1929, p. 6.

attention to the significance of tubomesotympanic inflammation of both the mild and the severe type and outlined the course taken by the lesions in cases of epiretrotympanic suppuration in the mild and severe forms and also in cases in which there was and was not necrosis of the bone. A rereading of my discussion in conjunction with this recent study demonstrates that the conclusions are essentially in accord.

Heretofore it has been held that a spontaneous perforation appearing in the area of Shrapnell's membrane is evidence of chronicity and is a detail of an otoscopic picture of a lesion which is located on the sclerotic type of bone. Brock's [4] report is therefore noteworthy because it seemingly contradicts this thesis. He reports 2 cases in which the patient came to autopsy. In these cases spontaneous perforation had occurred in Shrapnell's membrane during an acute onset of otitis. Autopsy revealed pneumatized bone in one and sclerotic bone in the other. The article is illustrated by photomicrographs. The observation is rare but does not actually destroy the formula established by Wittmaack when he described the pathologic process of retrotympanic suppuration. The acute necrotic otitis may well have accounted for the presence of pneumatized bone in Brock's case. The sclerotic bone in the second case is the usual observation in such a lesion in the epitympanum. Thus one finds substantiation of Wittmaack's observation rather than lack of it in Brock's report.

Diagnosis is stressed in other recent articles. Cases are reported in which there was a history of aural discharge. On examination, after careful cleansing of the external auditory canal, an intact drum was discerned, and the origin of the aural discharge became a problem. In this connection the reports of Jones [5] and Rosenwasser [6] are important. These authors observed that the suppuration was caused by a rupture into the external auditory canal of an abscess of the adjacent tissues, not from the parotid gland, however. Two factors concern differential diagnosis in cases of suppuration of the middle ear: the presence of the intact drum head and the definite location of a fistulous opening in the wall of the external canal. Once the canal is cleared of accumulated detritus and pus, acuity of hearing will be found unimpaired to any great extent. In my own experience I have noted this occurrence among children, but I have also noted such a condition in older subjects, in 1 particularly of advanced age.

4. Brock, W.: Mikroskopischer Nachweis des Vorkommens von Spontanperforationen im Bereich der Membrana Shrapnelli bei der akuten Otitis, Ztschr. f. Hals-, Nasen- u. Ohrenh. **35**:439, 1934.

5. Jones, A. C.: Report of Three Cases of Rupture of Abscesses into the External Auditory Canal Other Than That of the Parotid, Ann. Otol., Rhin. & Laryng. **43**:624, 1934.

6. Rosenwasser, H.: Rupture of Suppurative Cervical Glands into the External Auditory Canal, Arch. Otolaryng. **19**:610 (May) 1934.

Another lesion which has importance in the differential diagnosis and must be recognized as distinct from otitic suppuration is described in the paper by Leicher,[7] who reports 3 cases of psoriasis in which the lesions were present on the membrana tympani. The scales should be removed by applying a salve of boric acid, ammoniated mercury or salicylic acid. The entire external canal should be covered with the ointment. Internally, the administration of iodides and arsenic is indicated, and the patient should be given a fat-free diet. When the lesions have extended and penetrated to the deeper fibrous layers of the drum head, spontaneous perforation may ensue, simulating an otitic infection. Recognition of the cutaneous lesion, a roentgenogram showing the absence of haziness of the mastoid cell and the history of the case will help in differentiation.

One can also find academic discussion and differences of opinion on the topic of mucosus otitis. The elements entering into this moot question are many. One is the bacterial flora. Lemaître [8] believes that Pneumococcus mucosus is the cause of this otitic lesion more frequently than is Streptococcus mucosus. He has observed that the so-called P. mucosus causes an otitic suppurative lesion which runs an asymptomatic course. There results extensive destruction of tissue without marked clinical symptoms. In about 35 per cent of Lemaître's cases an endocranial lesion, usually meningitis, resulted. The intracranial complication occurred most often during the first week of the illness. Lemaître states that sinus thrombosis is practically never encountered with this organism. He advises early and extensive surgical intervention as soon as the diagnosis becomes established.

There are those [9] who profess to be able to diagnose mucosus otitis from the clinical picture, the characteristic sluggish course of which, accompanied by marked diminution of acuity of hearing and an otoscopic picture of marked thickening of the drum head, furnishes diagnostically significant data. I should, however, hesitate to diagnose so specific a lesion on the clinical observations alone. As Rollins [10] has shown, the bacteriologic diagnosis is not simple. He lays down the rule that the bacterial flora must be identified and the identification confirmed by both smears and cultures from other capsulated micro-

7. Leicher, H.: Ueber Psoriasis am Trommelfell, Ztschr. f. Laryng., Rhin. & Otol. **24**:393, 1933.

8. Lemaître, F.: "Pneumococcus Mucosis" en Otologie, Bull. Acad. de méd., Paris **3**:782, 1934.

9. Shambaugh, G. E.; Hagens, E. W., and Shambaugh, G. E., Jr.: 1934 Year Book of the Eye, Ear, Nose and Throat, Chicago, The Year Book Publishers, Inc., 1934, p. 358.

10. Rollins, H.: Beiträge zur Kenntnis der Mucosus Otitis, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **137**:333, 1933.

organisms, and he particularly recommends the use of the thionine stain in these determinations. With the organisms thus identified, the laboratory observation taken with the clinical and otoscopic findings makes the diagnosis.

I have found that differentiation between P. mucosus and Str. mucosus rests not entirely on morphologic findings but rather on their respective growth characteristics. In some instances colonies are recovered which stain and appear typically like pneumococci but which cause tissue reactions and have growth characteristics like those of streptococci. The reverse also has been observed.

It might not be amiss to interpose a note here calling attention to some recent advances in the differentiation of the various types of pneumococci which hitherto were assembled under the classification of type IV. This has resulted in giving an added stimulus to investigations of both pulmonary and other infections.[11] Even the well established type III pneumococcus has not escaped the finer differentiation which modern bacteriologic methods afford. This particular strain has always been considered the most virulent. Nevertheless, clinicians have noted that not all patients who suffer from disease caused by this strain react alike; some present a milder course with a favorable outcome, while others, by far the majority, present an infection which terminates fatally.

In 1928 Sugg, Gaspari, Fleming and Neil[12] described a virulent strain of pneumococcus which was related to the type III pneumococcus immunologically but otherwise was not identical with it. Rabbits are more susceptible to this strain (called the Thomas strain or type VIII) than mice, which more readily succumb to type III. Again, the type VIII pneumococcus shows a capsule smaller than that of type III, its hemolytic properties are more marked, and the organisms tend to form chains. Bullowa[13] has studied this type of infection from the clinical standpoint. He found that in adults its incidence as the causative factor in pneumonia was 5.9 per cent. It presents a much less serious outlook than pneumonia caused by the type III pneumococcus. While the type VIII pneumococcus invades the blood stream more frequently than type III, it causes a smaller percentage of fatalities. Clinically, it resembles the "Str. mucosus" of older literature in that, after an

11. Cooper, G.; Edwards, M., and Rosenstein, C.: The Separation of Types Among the Pneumococci Hitherto Called Group IV, and the Development of Therapeutic Antiserums for These Types, J. Exper. Med. **49**:461, 1929.

12. Sugg, J. Y.; Gaspari, E. L.; Fleming, W. L., and Neil, J. M.: Studies on Immunological Relationships Among the Pneumococci, J. Exper. Med. **47**:1917, 1928.

13. Bullowa, J. G. M.: Pneumonias Due to Pneumococcus Type VIII, Am. J. M. Sc. **190**:65, 1935.

apparent subsidence of all symptoms, it may suddenly invade the meninges or blood stream, with a resultant fulminating fatal lesion.

This strain seems to attack adults more frequently than it does children. It is to be suspected when the organisms recovered from the sputum occur in chains. The exact diagnosis of this variety of pneumococcic infection can be made from the agglutinin reactions. The agglutinins, when demonstrable, may be transferred to therapeutic serum with a decidedly beneficial effect to the patient infected with this strain of pneumococcus.[14] This is of special importance in view of the common belief that serum therapy is efficacious only when the type I pneumococcus is the causative factor. The marked contrast in the results obtained by Bullowa in the patients who had pneumonia due to the type VIII organism and were not treated with serum (61.9 per cent fatality) and in those who received serum (only 16 per cent of whom died) speaks for the need of a more accurate determination of the strain of the pneumococcus in each case if specific serum therapy is to be given a fair trial to evaluate its usefulness in the therapy of pneumonia.

So much has been written about this topic that it seems that a common understanding would ensue; yet the problem this invading organism presents remains unsolved. When present in a given case, the strain of the pneumococcus always presents itself as a problem for individual solution. There is a considerable school the members of which recommend operative therapy, irrespective of the clinical aspects, the blood picture or the roentgen findings. With these workers I do not find myself in accord. No operative therapy is rationally indicated on bacterial findings alone. The summation of the data presented must still be the criterion. Moreover early operation, often based on bacterial findings alone, has not spared the patient a subsequent intracranial complication, and my own experience bears out the fact that in many cases complete recovery from mucosus otitis occurs without surgical intervention. Clinical judgment of the individual case becomes paramount.

The relationship of systemic disease to a superimposed otitic lesion is always important. The influence of the underlying condition and its rôle in the course which the local lesion takes have often been commented on in these summaries. Uffenorde's[15] study of otitic suppuration and diabetes is timely. The lowered resistance to bacterial invasion and the increasing tendency with which this results in extensive destruction of bone, usually proceeding asymptomatically, have often

14. Bullowa, J. G. M.: Therapeutic Pneumococcus Type VIII (Cooper) Serum, J. A. M. A. **102**:1560 (May 12) 1934.

15. Uffenorde, W.: Diabetes und Mittelohrentzündung, Ztschr. f. Hals-, Nasen- u. Ohrenh. **35**:385, 1934.

been stressed. Uffenorde accounts for the marked loss in acuity of hearing by ascribing it to the toxic action of the blood on the end-organ in the labyrinth. Surgical risk is lessened by reducing the content of blood sugar by employing appropriate diet and a proper use of insulin. He advocates caution and watchful waiting until the diet and insulin have had an opportunity to lessen the surgical risk. With this caution I am not in accord. Too often while the patient is being prepared for surgical intervention and his system is being temporarily made as nearly sugar-free as possible, the local otitic lesion is progressing asymptomatically. Repeated roentgenograms become extremely helpful in determining the advance of the lesion of the bone, and, once convinced that lines of safety are imperiled, I have had best results from an early resort to operation to eradicate the suppuration. Once this is done, proper diet and insulin have been useful in enhancing recovery from the suppuration and in hastening cure of the local infection. Attempts to fortify bodily resistance in the face of a persistent local infection have not given me very good results. At best, however, the prognosis as to eventual recovery and safety to life is not too promising. In many cases the patient makes a primary recovery, to succumb subsequently to an endocranial lesion. Occasionally a month will intervene between the primary and the terminal clinical entity.

Another general condition, which in its nature is not an underlying process but which I consider rather as a sequela of otitic infection, is acute nephritis. Frey [16] cites the following case: Following a rapidly healing sore throat acute purulent otitis media appeared. After two weeks hemorrhagic nephritis set in. Subsequent to simple mastoidectomy this rapidly subsided. Frey recommends removal of the focus in the mastoid process in all cases in which acute nephritis becomes associated with an otitic and mastoiditic suppuration. This recommendation I can substantiate from personal experience with a number of such cases in which prompt remission of the renal symptoms followed eradication of the suppuration in the ear and recovery ensued. In Frey's report it may be questioned whether the nephritic lesion was not more likely a result of the infection in the throat—with which renal sequelae are by no means uncommon—rather than of the otitic infection, and I am inclined to hold that infections of both the kidney and the middle ear are secondary to infections which have their origin in the pharynx.

With the frequency of diphtheria among children, the frequency of diphtheritic otitis has often been a moot question. Bergh [17] made a study of the frequency of occurrence during a period of ten years.

16. Frey, H.: Akute Nephritis und akute Otitis, Ž. ušn. bol. **10**:8, 1933.

17. Bergh, E.: Ueber Otitis media akuta purulenta bei Diphtherie, Monatschr. f. Ohrenh. **68**:1, 1934.

He found the incidence to vary in different years, the range being from 1 to 12 per cent of all cases of otitis. Infection in the ear follows nasal diphtheria much more frequently than it does pharyngeal or laryngeal diphtheria. The specificity has no appreciable influence on the prognosis as to recovery from diphtheria. In only 0.3 per cent of cases of otitic diphtheria observed by Bergh did mastoiditis develop. The therapy was specific, and in all his cases there was response to specific therapy.

Hashimoto [18] reports finding the paratyphoid B bacillus in the aural discharge of a 7 year old boy with acute otitic suppuration. The child was suddenly seized with severe diarrhea and had a high temperature. A positive Widal reaction for the paratyphoid B bacillus was obtained. Within a few days after the onset otalgia was evident on the left side, with a red bulging drum head. Paracentesis yielded pus which on culture showed paratyphoid B bacilli. It is to be noted that Hashimoto obtained a positive culture from a discharging ear long before the organism could be recovered either from the urine or from the stool.

The various angles of the special problems which infantile otitic suppuration presents again engage the attention of observers. For American otologists the fine work of Wishart is still fresh in mind. Oreggie [19] presents a differing concept. He describes latent otitis in infants as usually being bilateral in its attack. The lesion develops without producing pain as a symptom and at first does not cause high levels of temperature. The membrana tympani is infiltrated but is not markedly reddened. Spontaneous perforation appears late when it is allowed to develop. One is wont to attribute many of the cases of gastro-intestinal disturbance and bronchopneumonia to this so-called latent otitis. Oreggie, on the other hand, believes that the aural lesion is secondary to the general infection, which in the summer months starts with gastro-enteritis and in the winter months has its commencement with bronchopneumonia. His observations were deduced from a study of 136 cases. Keller [20] reports a case in point, that of a 10 week old infant suffering from severe gastro-enteritis. After an antrotomy had been performed pneumococci were isolated as the invading micro-organisms and cure followed. In this case the bacterial findings were not those usually recorded. Most severe cases among infants have been ascribed to streptococci.

There is a school of bacteriologic thought which conceives that very young children and the aged usually have the pneumococcic type of

18. Hashimoto, M.: Otitis media durch B. Paratyphusbacillus, Otologia, Fukuoka **7**:681, 1934.

19. Oreggie, J. C.: Akute Mittelohreiterung beim Säugling, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **23**:309 (Sept. 25) 1934.

20. Keller, W.: Latent Mastoiditis as a Case of Gastro-Enteritis in an Infant, Indian J. Pediat. **1**:115, 1934.

bacterial invasion and that youths and young adults usually succumb to a streptococcic invasion. There is much in this with which I am in accord when a large mass of clinical material is assembled for survey. The isolated case report, with its specific bacterial study, lends support to the point of view just expressed, notwithstanding contrary opinions in individual reports of bacteriologic findings.

Burgess [21] again opens the discussion of the indications for surgical intervention in cases of aural infection associated with nutritional disturbances. He is convinced of the causal relationship of otitis in infants to nutritional disorders. He contends that since in such cases the aural phenomena are not sufficiently evident the indications for antrotomy should be viewed from the pediatric rather than from the otologic standpoint. I believe that there should be a common standpoint, from neither the one nor the other special branch of medicine, and until other data are presented to disprove it, I believe with Wishart that the aural condition shall be judged on its merits and that surgical treatment should be used when the local condition presents evidence to warrant it.

In addition to the ordinary form of mastoiditis in the early months of life, a lesion is often found which manifests itself chiefly in toxic phenomena. This toxicity either assumes a distinct septic type of infection or shows itself as a kind of toxemia. In both types the aural lesions are meager in significance and extent. This is the substance of the observations made by György [22] and substantiated in the report made by Brokman.[23]

When treatment is directed to combat the intoxication and proves futile, the mastoid area comes into question as the possible location of the offending focus of infection, and antrotomy becomes indicated. The aforementioned authors stress the idea that the usual indications for surgical intervention are to be sought not in otologic findings alone but in the general clinical picture. Here again I find this point of view in contrast to the accepted view of Wishart.

Hofer [24] summarizes the conditions as he has usually found them among infants. He describes four conditions which he believes are forms of otitic sepsis: sepsis which presents itself with metastasis

21. Burgess, T. S.: Mastoid Infection and Nutritional Disturbances in Infants: Report of Three Cases, Ann. Otol., Rhin. & Laryng. **43**:606, 1934.

22. György, E. V.: Die Rolle der Mastoiditiden in der Säuglingstoxikose, Arch. f. Kinderh. **100**:238, 1933.

23. Brokman, H.: Ueber die Beziehungen der Mittelohrentzündung zu den Durchfallserkrankungen im Kindesalter, Schweiz. med. Wchnschr. **64**:208, 1934.

24. Hofer, I.: Ueber die klinischen Verlaufsformen otogener Allgemeininfektion (Otogener sepsis) im Säuglings und Kindesalter, Jahrb. f. Kinderh. **141**: 177, 1933; **141**:291, 1934.

accompanied by a lesion in the sinus, sinus thrombosis; sepsis which presents itself with metastasis but gives no evidence pathologically of sinus thrombosis; sepsis which causes neither metastasis nor sinus thrombosis, and, finally, sepsis which causes no metastatic lesions but shows distinct evidence of sinus thrombosis. Hofer believes that all the forms begin as perisinuous abscess, but he admits that optic sepsis in infants may also be due to osteomyelitis. He notes that metastases occurring in infants are mostly located in the lungs and rarely, if ever, in the brain or the meninges. He claims that this finding does not hold for adults, or even for older children. I shall refer to Hofer's report later, but before doing so—because it will make my comment clearer—I mention the study of Laskiewicz,[25] who made observations on 750 cases of purulent otitis in children, carrying on his studies over a period of five and a half years. He notes that in cases of diploic mastoid disturbances a chronic type of inflammation results in spreading the lesion beyond the boundaries of the middle ear and the mastoid process. He encountered defects and fissures in the epitympanic space and often in the fallopian canal. Tuberculous children are susceptible to severe otitic suppuration, which is not necessarily tuberculous. Rachitic children also present severe otitic infections, frequently complicated by endocranial lesions. Breast-fed children have less protracted infections and lighter attacks than artificially fed children. He stresses the necessity of comprehending the underlying constitutional factors.

In closing this comment on the work of Hofer and the others who have reported on sepsis in very young infants associated with gastroenteritis, bronchopneumonia and other metastatic lesions, it occurs to me that soon one will be obliged to reopen the whole question because of the evidence which Ramadier [26] presents in that portion of his monograph dealing with osteomyelitis of the petrosal pyramid in young infants. In the estimations and summations the work of Renaud,[27] Aloin,[28] Jaymes [29] and others has, to a great extent, been overlooked. The evidence presented by these French observers would seem to hold the key to the question and to furnish both an explanation of the occurrence of the sepsis and the metastases and a better comprehension of the clinical evidence on which to base surgical therapy. This survey

25. Laskiewicz, A.: Les facteurs morphologiques et constitutionnels dans les otites moyennes, aigues et chroniques chez les enfants, Rev. de laryng. **55**:175, 1934.

26. Ramadier, J.: L'ostéite profonde du Rocher, Paris, Chanteney, 1933, p. 8.

27. Renaud, Maurice: Otites et les suppurations du Rocher chez le nourrison, Bull. et mém. Soc. méd. d. hôp. de Paris **45**:1326, 1352 and 1384, 1921.

28. Aloin, H.: L'ostéomyélite mastoïdienne bilatérale chez le nourrison et l'enfant du premier âge, Rev. de laryng. **50**:191 (March 31) 1929.

29. Jaymes, quoted by Ramadier.[26]

is hardly the place to open this discussion. It must suffice to draw attention to this angle of the problem so that those interested may be directed to a vast storehouse of accumulated clinical and pathologic data which contribute toward the solution of the problem presented by aural infections in very young infants.

THE CHRONIC LESIONS

Last year I called attention to the work of Curcio,[30] who, studying both acute and chronic infections of the middle ear, stresses the differences in the size of the pupils. He advances the explanation that myosis or mydriasis, as the case may be, follows pressure exerted by the exudate on the sympathetic nerve fibers in the middle ear, often producing paralysis or irritation of the fibers. Since then I have looked for this finding, but I have been unable to substantiate Curcio's observations. Nevertheless, it is to be noted that de Stella[31] reports 3 cases of healed purulent otitis in which a large dry perforation remained after healing. In all 3 cases de Stella noticed marked myosis of the pupil on the same side as the lesion. His explanation of the phenomenon is similar to that advanced by Curcio.

A review of reports covering a large number of cases always furnishes instructive findings. Record is therefore made of Rüedi's[32] report of his study of 763 cases of chronic suppuration of the middle ear which were observed at the university clinic in Zurich during the period from 1919 to 1932. In all these cases cholesteatoma was noted. In 45 the lesion was bilateral. In 762 cases the perforation in the membrana tympani was marginal, and only in 1 instance was it centrally located. In one third of his cases cholesteatoma followed scarlet fever, measles or diphtheria. In 6 per cent tuberculosis was the cause of the chronicity. In 342 cases an operation was performed, with a mortality of 1.18 per cent. Those cases in which the perforation was located in Shrapnell's membrane gave the highest percentage of intracranial complications.

Dean and Pfingsten[33] studied various laboratory methods in an endeavor to establish a diagnosis of cholesteatoma. They found that

30. Curcio, Gaetano: Reazione pupillare nelle otiti medie purulente, Otorino-laryng. ital. **3**:533, 1933.

31. de Stella, H.: L'anisocorie dans les inflammations de la caisse, Ann. d'oto-laryng., Dec. 1933, p. 1410.

32. Rüedi, L.: Zur Klinik und Therapie des Mittelohrcholesteatoma, Schweiz. med. Wchnschr. **64**:411, 1934.

33. Dean, L. W., Jr., and Pfingsten, M. G.: A Chemical and Cytological Study of Aural and Nasal Exudates as Regards the Chemical Diagnosis of Cholesteatoma, Ann. Otol., Rhin. & Laryng. **42**:484, 1933.

the chemical diagnosis proposed by Rejtö [34] and others is not applicable nor is it practical for clinical use. They found that ordinary cerumen will also give a positive reaction to the test owing to its high content of amorphous cholesterol. Furthermore, crystalline cholesterol is to be found microscopically in cerumen in cases of ordinary acute otitis and in those of purulent chronic otitis media. It has also been found in cases of otitis externa. To compare this report with that of Simonetta [35] is to furnish a degree of substantiation from another angle. Simonetta too found that chemical tests to establish the diagnosis of cholesteatoma fail. He made studies on the relationship between the incidence of cholesteatoma and the presence of cholesteremia. A certain parallelism was found to exist but it was inconstant and inconclusive. This observer holds that the production of cholesteatoma is not dependent on the constitutional presence of an increased cholesterol content in the blood.

Krepuska [36] makes a report which is unusual because the observations are contrary to accepted ideas of otitic tuberculosis. It is ordinarily held that otitic tuberculous lesions are secondary manifestations. He reports a case of tuberculous otitis and labyrinthitis which terminated in tuberculous meningitis; autopsy revealed no tuberculous lesion anywhere else in the body.

Feuz [37] cites a case of tympanomastoid tuberculosis in which he performed a radical mastoidectomy. During the after-care sequestration with excessive formation of granulations occurred. No epidermization took place. Eventually he used a tamponade saturated with a salve made of sulphonated bitumen, N. F., 0.1 part; pyrogallol, 6 parts, and petrolatum and hydrous wool fat in equal amounts, 12 parts. This was applied to the granulating surface every second day and resulted in a cure and a dry ear within six weeks. In connection with such cases it is recalled that the treatment of tuberculous otitis with a 10 to 30 per cent solution of pyrogallol in alcohol was reported on favorably by Wittmaack thirty years ago.

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34. Rejtö, Alexander: Weitere Beiträge zur chemischen Diagnose und Therapie des Mittelohr-Cholesteatoma, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **19**:220 (Sept. 25) 1932.

35. Simonetta, B.: Ricerche intorno ai possibili rapporti tra colesteatoma dell'orecchio e colesterinemia, Boll. d. mal. d. orrechio, d. gola, d. naso **51**:413, 1933.

36. Krepuska, S.: Primäre Otitis tuberculosa mit Meningitis, Acta otolaryng. **19**:415, 1934.

37. Feuz, J.: A propos du traitement de la tuberculose par l'acide pyrogallique, Rev. de laryng. **54**:1045, 1933.

Dore [38] studied the absorption of drugs from the middle ear in 57 cats. The eustachian tube was closed by cauterization, and various drugs, such as pilocarpine hydrochloride, strychnine, atropine, heroin, cocaine and aconite, were introduced into the middle ear. Typical pharmacologic reactions were obtained in each instance. For what question a solution was sought is not clear. It is known that the lining membrane of the tympanic cavity is a mucous membrane in name only. It is not a secreting membrane normally. It does absorb like most human tissues and the reactions obtained demonstrate this. The results obtained by Dore were due to the absorption of the drugs, which power of absorption almost all the bodily tissues possess.

SINUS THROMBOSIS

The conceptions regarding septic sinus thrombosis have become stationary. The indications for surgical therapy and the methods of application are standardized. It is not surprising, therefore, that the survey of the year's literature gives so little on which thoughtful comment is necessary. The available material consists mainly of reports of cases. The outstanding exception is the work of Dixon and Frenckner, to which reference will be made later.

Munyo [39] cites 7 cases of acute purulent otitis in which sepsis appeared immediately after paracentesis. In 6 of these cases a hemolytic streptococcus was isolated from the blood. Antibacterial and antitoxic agents failed to improve the condition. Antrotomy was then performed in all cases with an immediate recession of all symptoms. It is to be noted that pus was not found in the pathologic process which presented itself at the time of operation. There were marked hyperemia and markedly inflamed cell linings, according to the author's report. These observations are noteworthy because they coincide with those which Körner and many others, in addition to myself, have made on the septicemia which is part of the clinical picture of hemorrhagic mastoiditis. The lesion is not recognized as often as it occurs. I, too, found positive blood cultures in my cases in which the condition cleared up after simple mastoidectomy when surgical intervention was promptly used, before the great venous channels became the seat of intramural and mural thrombi. The 2 cases reported by Syme [40] are not unusual except in that there were unusual sequelae. In 1 case death ensued from a rapidly developing cerebellar abscess, and in the second case, in which the condition had its origin in chronic purulent otitis media associated with facial paralysis, signs of meningitis predominated in the

38. Dore, G.: Experimenti sull'assortimento dei farmaci introdotti nell'orrechio medio, Boll. d. mal. d'orecchio, d. gola, d. naso **51**:721, 1933.

39. Munyo, J. C.: Postotitic septicemia, Rev. argent. d. otol. **2**:632, 1933.

40. Syme, W. S.: Two Unusual Cases of Lateral Sinus Thrombosis, J. Laryng. & Otol. **48**:547, 1933.

clinical picture, yet autopsy revealed no meningitis but a fresh thrombus in the lateral sinus.

Fröding,[41] in a study of 9,600 cases of purulent otitis observed 61 cases of sinus thrombosis verified by findings at operation. In 49 there was evidence of an obliterating thrombus, and in 12, parietal thrombus. The thrombus developed in 45 acute cases and in 16 chronic cases. The results were as follows: In 73.3 per cent of the acute cases the patient recovered, and in 68.7 per cent of the chronic cases recovery occurred. The system of therapy on which surgical procedure was based consists of the following principles: Whenever septic symptoms appear, the sinus is exposed and inspected. If it is normal in appearance, it is let alone. If the appearance is abnormal or if symptoms continue or recur, the sinus is incised. When scanty or no bleeding is present, the internal jugular vein is ligated, and the sinus is cleaned out. When the wall of the sinus is gangrenous, it is cut out. With these principles I do not find myself completely in accord. It is not a safe rule to base surgical therapy on exposure and inspection of the wall of the sinus alone. Its macroscopic appearance is not an indicator of the condition in the walls or in the interior. This also leaves out of account all those cases of sepsis in which the thrombus develops murally from regression thrombi from smaller vessels emptying into the lateral sinus. It has been proved too often to be neglected that a mural clot may be present with a normal-appearing wall of the sinus exposed to observation in the mastoid wound.

Aukudowicz [42] reports 20 cases of sinus thrombosis, in all of which the thrombus was demonstrated. In 13 there was a positive blood culture, and in 7, a negative culture. Of the 13 cases in which the culture was positive Str. haemolyticus was present in 11, while in 2 others Streptococcus viridans was isolated. I seriously doubt that Str. viridans is the causative agent of sinus thrombosis. In my own experience the finding of the organism in the blood in a case of otitic or mastoiditic infection has usually been associated with an accompanying cardiac lesion. In addition, I call attention to the work of Hadjopoulos which has never been disproved. This observer and I [43] noted in the presence of a hemolytic strain of Str. viridans changes which suggested mutations in its forms. However, the general principle is still held that Str. viridans does not produce thrombosis of the lateral sinus.

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41. Fröding, C. A.: Cases of Sinus Thrombosis Treated at the Sabbatsberg Hospital, 1926-1931, Acta oto-laryng. **19**:335, 1934.

42. Aukudowicz, S.: Sinuskomplikationen im Verlauf der Mastoiditis, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **22**:585 (May 25) 1934.

43. Kopetzky, S. J., and Hadjopoulos, L. G.: The Relationship of Upper Respiratory and Alimentary Tract Flora to Mastoid Infections, Laryngoscope **42**:661 (Sept.) 1932.

Caminiti [44] reports a case of sinus thrombosis following an acute exacerbation of latent mastoiditis in a child of 6 years, who recovered after appropriate surgical intervention on the sinus and the internal jugular vein. Str. viridans was found, and the author comments on the rarity of this organism as a cause of otitic sepsis.

Aukudowicz found it necessary to tie the jugular vein in only 3 of his 20 cases. From the good therapeutic results, he feels that jugular ligation is not required in all cases, a well performed thrombectomy being sufficient.

Caliceti [45] reports a study of 19 cases, in 17 of which the condition was a sequela of an acute lesion of the middle ear, and in 2 of a chronic lesion. There was recovery in 17 instances, in 15 of the acute cases and in 2 of the chronic cases. He ligated the jugular vein in 13 of the acute cases and in 1 of the chronic cases. Caliceti believes in tying the internal jugular vein when a spread of the thrombus is evident toward the bulb. He stresses the need for individualizing the surgical procedure in each case.

In demonstrating three ways in which the blood stream may be invaded Lillie [46] reports 3 cases: (1) a case of hemorrhagic mastoiditis with metastasis and thrombophlebitis of the smaller veins in the mastoid process; (2) a case in which an anomalous internal jugular vein was present which rose at the internal jugular vein at the foramen, ran backward along the posterior border of the sternocleidomastoid muscle and joined and emptied in the lower part of the jugular vein, and (3) a case in which there was direct extension following a perisinuous abscess.

To continue the discussion as to the type of surgical therapy indicated by septic sinus thrombosis, Portmann [47] states his opinion that all cases require surgical intervention on both the lateral sinus and the internal jugular vein and reports cures in 100 per cent of all cases in which the condition was thus handled during the past eight years.

On the other hand, Almour,[48] discussing the basis for the election of a given therapeutic procedure in a given case, stresses that each case is a law unto itself and that generalizations are not possible or wise. He advocates as a measure in preventive treatment the removal of

44. Caminiti, F. P.: Su di un caso di ascesso extradurale e trombosi del seno traverso da streptococco viridanse, Arch. ital. di otol. **46**:457, 1934.

45. Caliceti, P.: Sul trattamento delle flebiti e tromboflebiti sinusogiugulare, Oto-rino-laring. ital. **3**:337, 1933.

46. Lillie, H. I.: Acute Hemorrhagic Mastoiditis with Thrombophlebitis and Sepsis, S. Clin. North America **14**:615, 1934.

47. Portmann, G.: Traitement chirurgical des phlébitis et thrombophlébitis sinuso-jugulaires, J. belge de neurol. et de psychiat. **34**:211, 1934.

48. Almour, R.: Discussion of the Basis for Selection of the Type of Procedure in Sinus Thrombosis, Laryngoscope **44**:454, 1934.

extensively involved walls of the veins to obviate infection of the blood stream. In general, when there is thrombosis without sepsis, a culture of the blood is sterile and at operation free bleeding is obtained from both ends of the opened vein, thrombectomy alone has been found to suffice. When sepsis is present and the blood stream is infected, i. e., when culture of the blood is positive, or when, in addition, the jugular bulb is the seat of the lesion, the best results are obtained by combining resection or ligature of the jugular vein with thrombectomy. With this view I am in accord.

An almost opposite view is held by Dixon,[49] who states that the jugular vein should never be operated on in a case of sinus thrombosis, because this does not necessarily stop progression of the lesion. While I agree that there are many other channels by which the lesion may travel and the sepsis may continue, the results obtained by prompt elimination of the thrombus in the sinus and the localization of the infection by ligature or resection of the jugular vein are still the determining factors which make one continue to use it. Until better and more thorough research has given better reason to abandon jugular resection or ligature, the recorded results will carry weight and I shall continue to advocate the procedure in cases in which it is indicated.

From the standpoint of prognosis, Glass [50] has found that the best results are obtained: (1) in children under 10 years of age when operation is undertaken early; (2) when a metastatic abscess has occurred, and (3) when the condition follows scarlet fever and the antiscarlet fever treatment has been administered in conjunction with surgical therapy. He regards the prognosis as bad: (1) when the patient is over 40 years of age, (2) when there is an acute exacerbation of a chronic condition, (3) when there is evident sepsis before simple mastoidectomy is performed and (4) when icterus is present.

Effler [51] makes a remarkable report which requires comment. He reports a case in which chronic suppurative otitis had existed for thirty-nine years. Suddenly, an acute exacerbation occurred, accompanied by chills and recurrent bleeding from the ear. Operation was performed, and during the first stage of the procedure a profuse aural hemorrhage took place. The operation was stopped. Three days later the patient died. Autposy revealed that the entire mastoid process was broken down and a large perforation of the wall of the sinus was present. There is much that is incomprehensible in this case report. A patient with

49. Dixon, O. J.: New Conceptions in the Management of Septic Sinus Thrombosis, Laryngoscope **44**:448, 1934.

50. Glass, E. J. G.: Blood Infections from Otitis Media: An Analysis of Sixty-Three Consecutive Cases, J. Laryng. & Otol. **48**:754, 1933.

51. Effler, L. R.: Suppurative Perforation of the Lateral Sinus with Pre-Operative and Operative Hemorrhage, Laryngoscope **44**:228, 1934.

long-standing chronic otitis, lasting thirty-nine years, instead of showing, as such patients usually do, a sclerosed mastoid, is reported as having a mastoid which was entirely broken down. It occurs to me to ask why the surgeon stopped his procedure on the occurrence of the hemorrhage. I have seen this happen and have never understood the attitude of otologic surgeons who when they inadvertently injure the sinus or are confronted with spontaneous hemorrhage into the sinus stop the surgical procedure which undoubtedly has been required by the patient's condition. Invariably, when this is done, there are subsequent complications, though not necessarily as dramatically fatal as that described in Effler's report. Conversely, when an accidental incision in the sinus takes place or when there is spontaneous rupture of the blood vessels and consequent hemorrhage, I have seen only good results when the resources of the surgeon were such that he controlled the bleeding and continued the indicated operation. To stop the hemorrhage I recommend wide exposure of the sinus, so as to block it off adequately.

Finally, there is the work of Frenckner,[52] who is endeavoring to develop a method of venosinography for use in the diagnosis of sinus thrombosis in general, which will be useful particularly when a bilateral otitic infection is presented and when determination of the side on which the blood vessel is involved comes into question. He trephines over the superior longitudinal sinus and slowly injects 10 cc. of solution of thorium dioxide. Toward the end of the injection a roentgenogram is made. From experimental work on monkeys, Frenckner feels that an obstruction in the lateral sinus can be determined. This work is important and, if proved practical, of great diagnostic value. In this country, Dixon, who has priority over Frenckner by almost a year, has reported similar experimental work and also some successful attempts on the human body. The successful consummation of this research will mark a notable advance in the field of otology.

THE PETROUS PYRAMID

The problems presented by lesions in various anatomic locations within and about the petrous portion of the temporal bone continue to engage the attention of observers. The general trend of the reports still denotes untenable premises, based on a misconception of symptoms and pathology. Few papers appearing during the period under survey are concerned with the fundamental philosophy of diseases of this location. There are still too many cases reported in which diagnosis and comprehension of the lesion were not obtained clinically at the bedside during life but were developed by reasoning backward after the death of the

52. Frenckner, P.: Some Experiments with Venosinography: A Contribution to the Diagnosis of Otogenous Sinus Thrombosis, Acta oto-laryng. **20**:477, 1934.

patient, when autopsy demonstrated the location involved. Anatomic studies are also being presented.

Thus, Myerson, Rubin and Gilbert [53] studied 200 temporal bones: In 36 bones of children under 7½ years of age, there were no air spaces in the petrosal pyramid and in 11 per cent there were pneumatic spaces. The subdivision of cell groups which these authors employ agrees with that adopted by Ramadier.[54] Hagens [55] too contributes a fine study in substantiation of the accepted anatomic relationships. His figures differ slightly on the percentage of pneumatization present. The distance between the cochlea and the carotid canal is most important. This becomes particularly true if the Almour technic is selected by the otologist to evacuate an encapsulated lesion at or near the so-called apex. This observer's figures substantiate those made by Kopetzky and Almour [56] in their original communication. Hagens finds that the distance varies from 4 to 10 mm., averaging about 6.2 mm. Further substantiation of the original contentions [56] are to be found in the observations of Aprile,[57] who, finding his results in agreement with those of Belan and Zuckerkandl, reports that 37.5 per cent of all pyramids examined by him were pneumatic. Osteitis occurred in these bones. In diploic petrous bones he reports osteomyelitis. In this observation he is in accord with Almour and me,[56] Ramadier [54] and many others. Aprile's report also substantiates the avenues of invasion which Almour and I described.

Regarding the various reports of studies in which there has been an endeavor to fix the percentage of incidence of pneumatization in the petrous portion of the temporal bones, it may not be amiss to remark that the establishment of this fact can be only of academic interest for the practicing otologist, since when he is confronted with a given case he is not concerned so much with the percentage of occurrence of pneumatization as with gaining knowledge of what type of petrous bone is present in the particular case. On learning this, he will know whether he has to deal with osteomyelitis or with osteitis.

The literature surveyed contains much on paralysis of the abducens nerve. The connection which palsy of the sixth nerve holds, particularly

53. Myerson, M. C.; Rubin, R., and Gilbert, J. G.: Anatomic Studies of the Petrous Portion of the Temporal Bone, Arch. Otolaryng. **20**:195 (Aug.) 1934.

54. Ramadier,[26] p. 26.

55. Hagens, E. W.: Anatomy and Pathology of the Petrous Bone Based on a Study of Fifty Temporal Bones, Arch. Otolaryng. **19**:556 (May) 1934.

56. Kopetzky, S. J., and Almour, R.: The Suppuration of the Petrous Pyramid: Pathology, Symptomatology and Surgical Treatment, Ann. Otol., Rhin. & Laryng. **39**:996, 1930; **40**:157, 396 and 992, 1931.

57. Aprile, V.: Sulle correspondenze e divergenze strutturali delle mastoidi e della rocca in rapporto alla pneumatizzazione, Valsalva **9**:809, 1933.

with infections in and about the petrous portion of the temporal bone, is gradually being better comprehended, although confusion still exists.

Greenfield [58] feels that thrombosis of the inferior petrosal sinus can cause palsy of the abducens nerve. In his report he mentions a case in which there was bilateral palsy of the abducens nerve. He reasons that the close proximity of the two abducens nerves to each other and the spread of the phlebitis to the opposite inferior petrosa account for the finding. Incidentally, his patient recovered after the usual surgical treatment for sinus thrombosis. A consultation with any competent anatomopathologist would show the false premises on which this reasoning is based. It seems that the cavernous sinuses and the whole anatomic structure of the sphenoid bone which are interposed between them were forgotten.

Sjöberg [59] furnishes substantiation of the contention of Eagleton anent the importance of the anatomy of Dorello's canal in its relationship to the incidence and occurrence of palsy of the abducens nerve. He shows that the width of this canal varies individually and that when the diameter of the canal is small palsy of the sixth nerve appears early in the course of an inflammatory reaction. When the canal is wide the same degree of inflammation may never produce the palsy. In other words, the appearance of the palsy is dependent on a mechanical factor relying on the antomic structure present in a given case.

Johnston [60] gives a significant report on 4 cases. In 3 paralysis of the abducens nerve appeared early, before mastoiditis had manifested itself. Simple mastoidectomy sufficed to bring about a cure in these cases. In the other case paralysis of the abducens nerve appeared eight days after antrotomy was performed. The patient died. I have held that early paralysis of the abducens nerve is not significant in relation to petrosal infection and that its late appearance presages the commencement of meningeal inflammation. Johnston's report would seem to add substantiation to this point of view, more of which is furnished from abroad by the reports of Ruttin [61] and Neuman, who hold similar opinions.

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58. Greenfield, S. D.: Etiology and Pathology of Paralysis of the Abducens Nerve Associated with Sinus Thrombophlebitis, Arch. Otolaryng. **19**:336 (March) 1934.

59. Sjöberg, A. A.: Contribution to the Knowledge of the Genesis of Certain Symptoms of Apicitis, Acta oto-laryng. **19**:479, 1934.

60. Johnston, W. H.: Abducens Paralysis Complicating Otitis Media and Mastoiditis, Ann. Otol., Rhin. & Laryng. **43**:94, 1934.

61. Ruttin, E.: Zur Klinik und Operation der Pyramidenspitzeneiterungen und des peri-apicalen Extraduralabscesses, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **22**:784 (Feb. 25) 1934.

Uyama [62] reports on cases of purulent leptomeningitis in which the significant factors were lesions in the petrosal bone. In 1 case the causative focus was found post mortem in an epidural and subdural abscess, the sequela of a perilabyrinthine cell invasion. In the second case the cell structure behind the superior semicircular canal was found to be the seat of the lesion. From this locality the lesion spread and ruptured both subdurally and intradurally. My contention, stressed on numerous occasions, that the lesion is capable of recognition while still intrapetrosal is again brought to mind. Once the peripetrosal regions are invaded, the subsequent development of meningeal infection proceeds rapidly. Watchful and futile waiting for signs of meningeal involvement before resorting to surgical therapy will cost, and does take, many lives.

Fowler [63] has made an impressive study from the postmortem standpoint and contributes valuable observations on both the gross and the microscopic anatomic changes. He shows that the symptoms of petrositis are too often not recognized until intracranial invasion has taken place. He stresses the necessity of recognition of the lesion, so that therapy may be promptly instituted if relief is to be obtained. His autopsy material of cases in which meningitis occurred shows that the origin of the suppurations was in the petrous portion of the temporal bone.

In the diagnosis of these lesions, Inferrera [64] calls attention to the roentgen examination in reporting 2 cases, in 1 of which the patient died.

Roberts [65] makes a meager report, incomplete in many details, of 4 cases illustrating the problem he discusses. In all paralysis of the abducens nerve was present. In the 2 cases in which the patient recovered he made a wide exposure of the middle cranial fossa through the operative field of a simple mastoidectomy. In the 2 cases in which the patient died dural exposure was not made. The report is interesting to me by reason of the contrasting results obtained: On the one hand, death followed one procedure, and recovery, another. May one not draw the lesson from this report that in the very act of removing the bony structure to expose the dura this surgeon removed much cell structure of the supracochlear area and thus eradicated and uncapped the site of the causal infection? Roberts believes that recovery in his cases was due to exposure of the dura. I believe that dural exposure per se

62. Uyama, Y.: Ueber die parilabyrinthären Zellen und den tiefgelegenen Epiduralenabscess, Zentralbl. f. Hals-, Nasen- u. Ohrenh. **22**:313 (March 25) 1934.

63. Fowler, E. P., Jr.: Suppuration of the Petrous Tip, J. A. M. A. **102**:1651 (May 19) 1934.

64. Inferrera, A.: Contributo clinico-radiografico alla patogenesi della paralisi de VI di origine otitica, Arch. ital. di otol. **44**:338, 1933.

65. Roberts, E. R.: Infection of the Petrous Apex, Laryngoscope **44**:274, 1934.

was not of curative value but that in making the exposure he eliminated diseased bone.

Sunde [66] raises the issue that the so-called latent or, as I term it, quiescent period in the development of petrositis may very well be the onset of the "healing" period and may not be the stage antecedent to an intracranial development. Sunde reports a case in which orbital pain, stiff neck and a Kernig sign were present; at operation pus was found in the posterior perilabyrinthine region. With the onset of meningeal symptoms the petrosal signs and symptoms disappeared. The patient recovered. The author's observations may not be questioned, and while conclusions based on 1 case can hardly be authoritative, his experience, even with this case, is contrary to mine, based on observations on many (34) cases. Healing sets in, in my opinion, by gradual abatement, by a general progressive lessening in the intensity of symptoms and not by an abrupt cessation of them. The abrupt cessation of symptoms has in my experience always preceded intracranial disaster after an interval of time.

Greenfield [67] reports 2 cases. In 1, an 8 year old child on the sixteenth day after mastoidectomy presented a rise in temperature with headache and orbital pain and reappearance of the otorrhea. After three weeks spontaneous healing ensued. In the second case a 6 year old patient presented high fever, recurrence of otorrhea and deep pain in the neck one month after mastoidectomy. Three weeks afterward palsy of the sixth nerve set in, and the child complained of difficulty in swallowing. On the sixty-seventh day after mastoidectomy a retropharyngeal gravity abscess was found and opened, and after that all symptoms disappeared within a week. This report records a lucky outcome of protracted so-called conservatism in therapy. Not all cases terminate this way. If they did the wealth of autopsy material which is reported in the literature would not have been obtained. Recently, Lillie, in discussing this type of conservatism, drew attention to its incorrectness. Therapy, according to Lillie, should be "adequate" or else it is "inadequate." To watch a case until rupture occurs and a gravity abscess forms and is evacuated is on a par with observing a case of mastoiditis until a subperiosteal abscess forms. The reason one does not await the formation of a subperiosteal abscess is the fear of an intracranial instead of a subperiosteal rupture. The same reasoning and fears hold for intrapetrosal infections.

66. Sunde, E. A.: Infection of the Petrous Bone: Rationale of Treatment and Report of a Case, Arch. Otolaryng. **19**:436 (April) 1934.

67. Greenfield, S. D.: Conservative Treatment of Petrositis: Report of Two Cases with Recovery Without Operation, Arch. Otolaryng. **20**:172 (Aug.) 1934.

On the other hand, Bricker [68] reports a typical case, with roentgenograms, in which he performed the Almour operation and procured recovery.

Smith [69] reports a case with recovery. In his case the condition was complicated by an abscess of the temporal lobe.

Nager [70] reports on 4 cases, in 2 of which the patient died. The lesion in the petrosa was demonstrated by roentgenograms in all of them. In the 2 cases in which recovery occurred, a focus in the petrosa was drained by surgical means. Nager calls attention to the usefulness of placing a probe in situ postoperatively and then of making roentgenograms to determine whether or not the surgeon has reached the lesion. With this recommendation I am in accord. I have found the procedure of great value.

Myerson, Rubin and Gilbert [71] propose a technic for operation on petrosal infections which closely simulates that proposed by Eagleton. Myerson and his associates differ from Eagleton, however, in that they do not perform a radical mastoidectomy. They remove bone from the squamosa and the posterior buttress and then elevate the dura. This enables them to reach the apex from above. When I commented on Eagleton's procedure two years ago I said all that I would say regarding this proposed technic. How surgeons using this technic avoid tearing the dura and severing the superficial petrosal nerve is still a question. According to the accumulated experience of many observers, in the majority of cases of petrosal infection there is a fistula. How does Myerson locate the fistula? And last, but by no means least, how by his procedure will he reach an involvement of the posterior perilabyrinth and a fistula located on the inner tympanic wall? If I may be permitted these pertinent questions, I shall wait until Myerson has had added experience, when I hope that he and his associates will report further on the technic in regard to handling cases presenting the factors enumerated here.

Ramadier [72] reports a study of 80 cases, of which 8 were his own. He points out that the lesion most often develops in richly pneumatic bone. Often, isolated perilabyrinthine areas are involved. In general,

68. Bricker, S.: Suppuration of the Petrous Pyramid, Laryngoscope **44**:284, 1934.

69. Smith, C. H.: Recurrent Mastoiditis with Petrositis, Temporosphenoidal Abscess, Large Epidural Abscess and Recovery, Laryngoscope **44**:221, 1934.

70. Nager, F. R.: Die Bedeutung der Röntgenuntersuchung bei den Eiterungen der Felsenbeinspitze, Acta radiol. **15**:475, 1934.

71. Myerson, M. C.; Rubin, H. W., and Gilbert, J. G.: Improved Operative Technic for Suppuration of the Petrous Apex, Arch. Otolaryng. **19**:699 (June) 1934.

72. Ramadier, J.: Les ostéites pétreuses profondes (pétrosites), Oto-rhino-laryng. internat. **17**:816, 1933.

the lesion develops slowly. Treatment, Ramadier holds, is purely surgical. He stresses this view despite possibilities of spontaneous healing. He then describes his technic, which was noted and commented on by me in a similar survey two years ago. In the discussion of this report Saignow emphasizes the importance of differentiating between osteomyelitis in infants and osteitis. To this, reference has already been made.

In addition, this year, 1935, has seen an extensive discussion in the American Otological Society, and the particular point raised by Saignow was the topic for discussion before the Section on Laryngology, Otology and Rhinology of the American Medical Association. These papers, naturally, will come up for comment next year. They are mentioned here so that those interested will be enabled to study the reports when they appear. To carry on the discussion of the question Saignow raises would be to repeat the gist of these presentations.

51 West Seventy-Third Street.

Abstracts from Current Literature

Ear

VASCULAR NOISES IN THE EAR. L. BALDENWECK, Rev. d'oto-neuro-opht. **12**:81 (Feb.) 1934.

After a review of the anatomy and physiology of the circulation and vasomotor innervation of the ears Baldenweck discusses exhaustively both physiologic and pathologic noises in the ear. The normal sounds of the circulating blood may be perceived by a person under conditions of perfect silence, as in a sound-proof chamber. The least extraneous noise causes their disappearance. These noises are described as a beating sound at first, which is soon replaced by a buzzing. The source is the movement of the blood in the vessels. In certain pathologic conditions, notably, obstruction of the eustachian tube or of the external auditory meatus, they may be perceived outside the sound-proof chamber.

Discussion of abnormal vascular noises is limited to those produced by (*a*) modification of the blood mass, (*b*) lesions of the labyrinthine vesels, (*c*) disturbances of the vasomotor sympathetic system and (*d*) lesions of the extra-auricular vessels. The first two causes are represented in modifications of tension (as in anemia and severe hemorrhage), anemia and congestion, arteriosclerosis and angiospasm of the labyrinthine vessels and otosclerosis. Noises produced by disturbances of the vasomotor sympathetic system are discussed at length. The roaring noises observed after the ingestion of quinine and sodium salicylate by patients with dyspepsia and in hepatic diseases are caused by vasodilatation. In patients with exophthalmic goiter at the menopause and with pelvic diseases, endocrine disturbances together with vasosympathetic dystonia come into play. Instability of the vasomotor system accompanying neuroses may easily react on the labyrinth and produce tinnitus. The same is true in patients with migraine and with the aura of epilepsy. Tinnitus following cranial trauma arises from modifications of the pressure of the cerebrospinal fluid and from meningeal adhesions, but it seems logical to presuppose a derangement of the sympathetic fibers surrounding the cerebral vessels which affects the vascular supply of the labyrinth or of the auditory nuclei. A curious phenomenon is tinnitus produced by pressure either on the head or neck or even, as in a case seen by Bourgeois, on remote parts of the body. A special lability of the vasomotor system must be assumed in such cases. Other cases that are similar but in which there is some pathologic condition of the ear or of the vessels supplying it have been observed. Probably, here, special connections between the skin and the deep sensibilities and the circulation of the ear exist. Another group of cases in which the noises are of sympathetic origin occurs in patients with hyperthyroidism and hypertension and in those undergoing the menopause. Jones and Knudsen include also cases in persons with foci of infection in the teeth, tonsils and sinuses. In some of these cases, compression of the vessels of the neck or certain positions of the head cause disappearance of the noises. Baldenweck thinks that this is due not to suppression of the blood flow but to an effect produced on the sympathetic plexus surrounding the vertebral artery, for it is not possible to influence the circulation in the internal auditory artery by such a procedure, since it arises from the circle of Willis.

Vascular noises in lesions of the extra-auricular vessels are noted in cases of aneurysm of the neck, head and interior of the skull, pulsating exophthalmos and intracranial tumors.

In the vasomotor type the therapeutic indications are such measures as tend to correct the vasodilatation or constriction: epinephrine, acetylcholine, physostigmine, jaborandi and atropine. Often the whole list must be used in turn. Other useful remedies are the administration of bromides, phenobarbital and cimicifuga, the application of leeches to the mastoid area and bloodletting. Surgical measures

include rupture of peritubal adhesions, intranasal operation, lumbar puncture, sympathectomy of the perivertebral plexus and ligation of the large vessels in cases of intracranial aneurysm. Section of the auditory nerve is not recommended.

DENNIS, Colorado Springs, Colo. [ARCH. NEUROL. & PSYCHIAT.]

MODIFICATIONS OF CEREBRAL PLETHYSMOGRAPHY DURING EXCITATION OF THE LABYRINTH. G. MARINESCO, S. DRAGONESCO and A. BRUCH, Rev. d'oto-neuro-opht. **12**:187 (March) 1934.

Following investigations of the vestibulovegetative reflexes, the authors have made plethysmograms of the cerebral contents for two patients with openings in the skull. During the cold caloric test a slight increase of the pulsatile oscillations was found, which was more manifest at the time of the appearance of the nystagmus and vertigo, with a change in the volume of the cerebral mass. Analogous phenomena appeared during galvanic excitation. The hypothesis is that afferent impulses from the labyrinth are transmitted from the bulbopontile vestibular nuclei to the vegetative centers (especially the vasomotor centers) in the bulbar floor; from there the impulses are reflected along the efferent vagosympathetic pathway. The conclusions from these observatoins are: (1) Labyrinthine excitation produces manifest cerebral vascular reactions; (2) the fact that these reactions follow stimulation by both cold water and galvanism shows that the point of departure of the reactions is the vestibular apparatus.

DENNIS, San Diego, Calif. [ARCH. NEUROL. & PSYCHIAT.]

LOCAL ANESTHESIA OF THE MASTOID PROCESS. A. MONTEIRO, Monatschr. f. Ohrenh. **68**:724 (June) 1934.

Monteiro anesthetizes the entire region of the mastoid process by means of a single injection. He selects the puncture point from 2 to 3 mm. outside of the retro-auricular sulcus, approximately in the center of the sulcus, and under the tendon of the posterior auricular muscle. The needle is introduced for a distance of 1 cm. between the outer border of the mastoid process and the inner limits of the auditory canal and then the fluid is injected. The needle is passed farther into the tissue, which is infiltrated with the anesthetic, and from 6 to 8 cc. of the fluid is injected. With proper technic, the auricle contracts during the injection so that it is reduced in size. The cartilaginous portion of the auditory canal must be pierced. The needle is pulled back and pushed upward in the direction of the retro-auricular sulcus as well as downward to the apex of the mastoid. Thus the entire surgical field is penetrated by radiating anesthesia. From ten to fifteen minutes is allowed for the spread of the anesthesia, during which the field is massaged with a piece of gauze to insure good distribution. For antrotomy, a 20 per cent solution of cocaine is instilled into the outer auditory canal, and for radical operations, the Bonain mixture is applied to the tympanic membrane or instilled directly into the tympanic cavity.

EDITOR'S ABSTRACT.

PATHOLOGIC CHANGES IN THE EAR IN CASES OF LATE CONGENITAL SYPHILIS. O. MAYER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:2, 1934.

Mayer points out that since Hutchinson first called attention to the triad of symptoms deafness, opacity of the cornea and deformity of the teeth which are frequently found in cases of congenital syphilis, numerous otologists have studied them but that, in spite of many clinical reports, the number of cases in which the tissues were subjected to histologic study is small. The author reviews the literature and describes his own observations. He reaches the conclusion that the lesion in late congenital syphilis of the ear is primarily located in the bone. There it appears in the form of gummatous osteomyelitis, gummatous periostitis or productive periostitis. These changes are so characteristic, at least during the florid stage, that they are readily identified as syphilitic, for no other disorder produces

similar lesions. The organs enclosed by the bone often become involved. The disorder develops slowly or in successive exacerbations. It may heal in one area and cause new changes in the area immediately adjoining. Changes may appear in different locations, and the areas between them may be normal. This explains the "disharmony" in the clinical manifestations, especially in the results of the functional tests of the labyrinth. The author considers the following pathologic changes important in producing the clinical manifestations: In the cochlea and in the vestibule there are endosteal miliary gummas, by which serous inflammation is produced. The inflammation leads to slight changes in the connective tissue of the scala and to ectasias of the cochlear duct, and it terminates in severe atrophy and shrinking of the membranes and of the epithelium. In the semicircular canals the productive type of inflammation predominates. It develops in the layers that adhere to the bone, and by the continuous new formation of connective and bony tissues the lumen becomes gradually smaller; however, the endolymphatic space remains open for a long time, and the circulation of the endolymph is not inhibited. The nervous apparatus may, in addition to this, become impaired by miliary gummas that appear in the spinal ganglion and in the cristae ampullarum. The acoustic nerve may become impaired by gummatous infiltration of the nerve channels, particularly in the region of the fovea superior. In the labyrinthine capsule there develop, as the result of osteomyelitis and osteitis, extensive transformations, defects of the labyrinthine wall and perforations. In the tympanic cavity osteomyelitis and periostitis produce ankyloses of the auditory ossicles and form osteophytes in the fenestrae. In the annular ligament of the stapes the gummatous infiltration results in malacia.

EDITOR'S ABSTRACT.

NYSTAGMUS OF VASOMOTOR ORIGIN AND ITS DIFFERENTIATION FROM LABYRINTHINE NYSTAGMUS. O. MUCK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:49, 1934.

Muck discusses whether it is possible to differentiate retrolabyrinthine angioneurotic nystagmus from labyrinthine nystagmus. He points out that previously he had been able to demonstrate that there is a certain form of continuous nystagmus which by simple experiments can be either temporarily slowed or entirely abolished for from two to twenty minutes. The experiments consist in the application of mechanical, thermic or electric stimuli to the periarterial sympathetic network of the brachial arteries (radial artery) or of a mechanical stimulus to the vertebral artery and in the subsequent observation of the continuous nystagmus. The author based these studies on the fact that from the stellate ganglion sympathetic fibers pass to the brachial as well as to the vertebral arteries. He was able to show that by applying mechanical, thermic or electric stimuli to these vascular regions noticeable nystagmus could be produced in some persons. He considered this artificially produced nystagmus to be of vasomotor origin. He further investigated whether an apparently angioneurotic nystagmus, which, as he assumes, is caused by a disturbance in the tonus of the conducting nerves in the region of Deiters' nucleus, can be influenced by certain stimuli. He summarizes his observations as follows: (1) In from 20 to 30 per cent of the persons examined nystagmus could be produced by applying mechanical, electric or thermic stimuli to the sympathetic nerve fibers of the radial artery; (2) the fact that the stellate ganglion sends sympathetic fibers to the posterior cerebellar artery and to its branches (in the region of Deiters' nucleus) as well as to the brachial arteries explains the development of this nystagmus; (3) in persons with continuous nystagmus it could be demonstrated repeatedly that by applying mechanical, electric or thermic stimuli to the radial artery the continuous nystagmus could be either retarded or temporarily abolished; (4) this observation justifies the conclusion that there is a central retrolabyrinthine nystagmus which is the result of an angioneurotic disturbance, and (5) the experiments described make it possible to recognize a nystagmus that is caused by an angioneurotic disturbance in the region of Deiters' nucleus. The author thinks that for practical purposes the application of ethyl chloride (the cold test) is the most suitable.

EDITOR'S ABSTRACT.

LABORATORY EXPERIMENTS IN THE PRACTICAL APPLICATION OF ELECTRIC HEARING APPARATUS. L. RIEGELE and F. WETHLO, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:59, 1934.

Riegele and Wethlo attempt a classification of the problem of whether the new electro-acoustic aids permit the construction of apparatus that is effective in cases of severe degrees of defective hearing. Their aim was to determine certain standards for hearing apparatus. The first point in their investigation was to determine to what extent the simple electromagnetic loud-speaker can be used as a bone telephone and as an auricle and in which use it would be the more advantageous. The authors made their tests chiefly on persons with defects of the middle ear. They first employed several magnetic systems that consisted of the ordinary commercial electromagnetic loud-speaker system to which a button-like end-piece had been attached. In addition to these they also employed the ordinary loud-speaker. Three types of application were tried with the loud-speaker systems: (1) The apparatus was used as a bone telephone, and as such it was applied to the mastoid process; (2) it was used on the ear, or (3) speech was reproduced through the loud-speaker. The authors also experimented with two acoustic prostheses, their own "tube circuit" and a "battery circuit." They found the first instrument to be superior. They further discuss the requirements for the three chief parts of acoustic prostheses, the microphone, the amplifier and the hearing capsule. They think that otologists have done good preparatory work and that industry must continue its efforts for the improvement of the apparatus.

EDITOR'S ABSTRACT.

CENTRAL DISTURBANCES OF HEARING IN A CASE OF CEREBELLAR TUMOR. K. VOGEL, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:265 (Nov.) 1934.

Vogel relates the clinical history of a girl, aged 12 years, whose otologic and neurologic symptoms indicated the existence of a cerebellar tumor. The tumor was removed, and the auditory disturbance disappeared. The case is interesting from the otologic point of view, because before the operation there existed a typical middle ear baryecoia with an upwardly shifted threshold for the perception of lower tones, a negative reaction to the Rinne test, a prolonged reaction to the Schwabach test and a normal upper threshold for tone perception. After the operation the hearing became normal again. Since the middle ear and the tube were free from pathologic changes and the auditory disturbance disappeared after the operation, it must be assumed that retrolabyrinthine impairment of the auditory nerve trunk by the cerebellar tumor was the cause of the disturbance. A more centrally localized impairment seems improbable because of the absence of accompanying symptoms, such as visual disturbances.

EDITOR'S ABSTRACT.

ALEUKEMIC LEUKEMIA. A. JAUERNECK, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:271 (Nov.) 1934.

Jauerneck relates the clinical history of a man aged 62, who had severe pains in the left ear. The disorder was diagnosed as acute otitis media, and paracentesis was done. There was a profuse discharge from the ear, and the patient was hospitalized for the treatment of mastoiditis. Antrotomy disclosed extensive destruction of the bone. The examination of the blood surprisingly revealed severe leukopenia with especial involvement of the granulocytes. Agranulocytosis was thought of, and because in this condition there exists a tendency to necrosis the prognosis was considered unfavorable, for necrotization of the surgical wound with fatal outcome was considered probable. The extensive osseous destruction in the mastoid process, which had developed in a comparatively short time, was considered proof. Various measures (roentgenotherapy of the long bones, intravenous injection of neoarsphenamine, irradiations with the quartz mercury vapor lamp

and blood transfusion) to increase the number of leukocytes were without avail. Injections of epinephrine effected only a temporary increase in the number of leukocytes. However, the daily injection of a preparation of the anterior lobe of the hypophysis was followed by a considerable improvement in the status of the blood. The antrotomy wound healed, and the patient was discharged in a considerably improved general condition. The author considers this case important because it demonstrates that an antrotomy wound may heal in spite of severe leukopenia. Moreover, it is noteworthy that the leukopenia improved considerably after the administration of the preparation of the anterior lobe of the hypophysis. Pentnucleotide, the newest preparation to effect an increase in the number of leukocytes, was not available at the time this patient underwent treatment.

EDITOR'S ABSTRACT.

SIZE, FORM AND MOTILITY OF THE CUPULA IN THE AMPULLAE OF THE SEMICIRCULAR CANALS. G. WILL, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:293 (Nov.) 1934.

According to Will, the cupula terminalis in the ampulla of the membranous labyrinth is an organ for the study of which the usual methods of fixation and staining are unsuitable. The employment of these methods leads to erroneous conclusions about the shape and the size of the cupula, aside from the fact that its mechanical function cannot be demonstrated. In order to obtain more exact information about these factors it is necessary to observe the living structure or to make observations on a preparation fresh from the recently living animal. However, the cupula is visible only after it has been stained. This is done by introducing a dilute solution of india ink, according to Steinhausen's method, by means of a fine pipet after the semicircular canal has been sectioned. If in doing this too strong a current is produced the cupula may be torn off, and after that it is difficult to detect the structure. The author was able to make pictures of several artificial deviations of the human cupula. The microsurgical method for the observation of the cupula in the ampulla of the semicircular canal of the membranous labyrinth, as Steinhausen described it for animals, was employed by the author in a somewhat modified form in studies on fresh preparations obtained from persons who had just been executed and on those taken from human fetuses. He was able to show that in the fresh state the cupula has a definite unchangeable form. It reaches from the crista to the roof of the ampulla, and in its movements it does not lose contact with the ampullar roof and walls. Thus, it closes the ampulla so that the latter is "endolymph-tight," and it is closely associated with the endolymph.

EDITOR'S ABSTRACT.

Larynx

HISTOLOGIC ASPECTS OF THE LARYNGEAL MUCOUS MEMBRANE OF PERSONS IN THE VARIOUS AGE GROUPS, PARTICULARLY OF THE AGED. N. A. PAUTOW, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:77, 1934.

Pautow points out that in cases of various pathologic processes it is desirable to know the histologic appearance of the senile changes in the normal laryngeal mucous membrane, for the majority of malignant tumors of the larynx develop in aged persons, and hyperkeratosis and other hyperplastic processes may in such cases prove to be precarcinomatous conditions, which finally become malignant. A review of the literature convinced the author that opinions differ considerably in regard to these changes, and he found that the knowledge concerning the senile changes in the fatty and elastic tissues is still somewhat limited. His own histologic studies were made on the necropsy material in fifty-one cases from the department of pathology and anatomy in Omsk. The age groups represented were: 3 years, 7 to 11, 18 to 22, 30 to 40, 41 to 55, 55 to 70 and 78 to 80. In these cases the larynx was free from macroscopically visible

changes, but for purposes of comparison the author examined also a number of specimens showing inflammatory changes. He mentions the methods he used for embedding and staining the material, and he then describes the histologic aspects of the laryngeal mucous membrane of persons in the various age groups. He includes a photomicrograph of the vocal cord of a small child and several of the vocal cords and false vocal cords of senile persons. He observed that in children the epithelial covering of the larynx consists entirely of cylindric epithelium, except that of the rim of the vocal cords, which is composed of several layers of pavement epithelium, either with or without papillae. The surface covered by pavement epithelium increases with advancing years. On the vocal cords the pavement epithelium becomes thicker, and papillae develop, which in senile persons become deep and ramified. The pavement epithelium gradually covers the false vocal cords also, and in aged persons it may even cover the entire ventricle of Morgagni. The cylindric epithelium of the false vocal cords changes in persons of middle age to stratified pavement epithelium, but without papillae; in senile persons it becomes much thicker and frequently sends deep papillae into the underlying tissues. The musculus vocalis exhibits atrophic changes in such persons. In the mucosa an accumulation of connective and fatty tissues develops with advancing years; these tissues gradually penetrate between the muscles and the glands, and the latter structures in senile persons are frequently compressed by hyalinized strands. The foundation of connective tissue of the vocal cords becomes fibrous and hyalinized in old persons, and a number of plasma cells also appear in the connective tissue, while the glandular stroma is thickly scattered with hyaline Russell bodies. The elastic tissue increases in the aged; it becomes coarser and denser, to form compact fibers. In cases of chronic inflammations of the respiratory tract in senile persons manifestations of an atypical epithelial growth are often demonstrable.

EDITOR'S ABSTRACT.

Nose

ATLANTO-AXOID SUBLUXATION OF NASOPHARYNGEAL ORIGIN. A. ZEITLIN and J. ODESSKY, Arch. de méd. d. enf. **37**:471 (Aug.) 1934.

Grisel's disease was mentioned for the first time in the medical literature by Desfosses in 1930. It is an acute nasopharyngeal infection involving the deeper tissues down to the fascia of the anterior suboccipital muscles; the slow and continuous contraction of these muscles caused by the inflammatory process produces torticollis and shifts the position of the articular surfaces sufficiently to produce subluxation without affecting the integrity of the ligaments.

The majority of the cases are in girls, on account of the poor development of the muscles in this region.

The authors report such a case in a girl of 12 suffering from influenza and mumps.

AMESSE, Denver. [AM. J. DIS. CHILD.]

REMARKS ON FATAL MENINGITIS AFTER INTRANASAL OPERATION ON THE ETHMOID BONE. HALLE, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:71, 1934.

Halle refers to a report by Mayer in which the author described the microscopic aspects in a case of fatal meningitis that developed after an intranasal operation on the ethmoid bone. The author questions whether this case disproves his opinion that radical removal of the ethmoid cells by way of the nose with preservation of the median portion of the middle concha, that is, an operation performed laterally from this concha, is relatively without danger. He discusses the normal anatomic conditions in this region but points out that anomalies are occasionally encountered. He emphasizes that interventions in this region require great caution, but he questions whether meningitis is a frequent complication if the operation on the ethmoid bone is done by a skilled and experienced surgeon. He has had considerable experience with this method, but in the last four years in his clinic there

has not been a single fatality after an operation on the ethmoid bone. To be sure, he does not state that he observed no complications and no fatalities after intranasal or external operations on the accessory sinuses; he merely emphasizes that after an intranasal operation on the ethmoid and frontal sinuses he did not observe complications that were caused by the method as such. In order to prevent the median concha or the thin median orbital wall from being torn away, in the course of the resection of the polyp or of the diseased cells, the author advises the operator to cut with a long knife directly laterally from the median concha and directly medially from the orbital wall and sagittally into the ethmoid bone and to sever the cellular walls. The surgeon must be careful not to proceed too high. The removal of polyps and of the diseased portions of the ethmoid bone is done with a sharp conchotome or with Cordes' instrument. The use of a blunt conchotome is inadvisable, because portions of the thin bony walls may be torn away. The author describes the further course of the operation, particularly how to secure a clear approach to the frontal sinus, and in the conclusion he stresses the opinion that the intranasal operation on the ethmoid bone can and should be just as radical as the external operation. He concedes that it no more guarantees complete freedom from danger than does mastoidectomy, but he does not consider it more dangerous. He rejects Mayer's demand to limit the intranasal intervention to the opening of the ethmoid cells, for he points out that such an intervention would be followed by relapses and would make a complete cure almost impossible.

EDITOR'S ABSTRACT.

INCREASED INCIDENCE OF INFECTION OF THE EAR AND OF THE ACCESSORY NASAL SINUSES DUE TO STREPTOCOCCUS MUCOSUS. P. OHNACKER, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:252 (Nov.) 1934.

From February 1933 to February 1934 Ohnacker observed among fifty cases of mastoiditis seventeen instances of infection with Streptococcus mucosus. The aural disturbances showed the same variety as those noted in reports covering longer periods. The author observed Str. mucosus also in three cases of disease of the accessory nasal sinuses, which he describes. He gained the impression that infections of the frontal sinus due to Str. mucosus are more likely to take an unfavorable course than those of the maxillary sinus. He refrains from making definite statements in regard to the ethmoid sinuses and the sphenoid sinus, but he points out that in one of the cases he observed there was destruction of the bone of the ethmoid sinuses and the sphenoid sinus and that in the case in which there was a fatal termination large quantities of pus were noted in the posterior ethmoid sinuses and in the sphenoid sinus. He expresses the hope that his paper will stimulate greater interest in the bacteriologic origin of diseases of the accessory nasal sinuses. He thinks that infections of the accessory nasal sinuses due to Str. mucosus are more frequent than have been observed hitherto.

EDITOR'S ABSTRACT.

Miscellaneous

THE DIAGNOSIS AND TREATMENT OF ABSCESS OF THE BRAIN. H. CAIRNS and C. DONALD, J. Laryng. & Otol. **50**:73 (Feb.) 1935.

Cairns and Donald in their discussion on abscess of the brain describe methods of operation and then analyze their own material, especially the cases in which failure resulted. They point out that abscesses of long duration usually have thick walls, and their experience shows that in these cases complete removal of the abscess and its wall is the only satisfactory treatment. Acute abscesses are not thick-walled, but they are rarely encountered at operation, and it is doubtful whether abscesses should be operated on in the acute stage. It is impossible to drain an area of acute purulent encephalitis, and it is probably unwise to disturb an abscess before it is localized. The diagnosis of abscess does not always indicate immediate

operation. The authors further discuss the problem of locating an abscess, and they describe the method of exploration. They then discuss drainage by the closed and open methods. Whatever method is employed in the treatment of the abscess, the after-treatment is the same. The patient should be placed in such a position that gravity assists in drainage of the abscess. Dressings should be done only at long intervals. The first dressing should be left undisturbed as long as possible, usually about a week, sometimes ten days or even more, the dressing being changed only if a complication ensues or if the patient is becoming uncomfortable because of the discharge. After discussing postoperative complications the authors give their attention to the difficulties and mistakes in diagnosis and treatment. They show that many difficulties in diagnosis can be overcome by careful history-taking and neurologic examination. They especially stress the importance of examining the visual fields. In each case of abscess there is need to form an estimate of when the abscess began and what stage it has reached, for this is the only way by which to gage the right moment for intervention. This can be done only by careful study of the history of the illness.

EDITOR'S ABSTRACT.

THE DIAGNOSIS AND TREATMENT OF ABSCESS OF THE BRAIN. S. SCOTT, J. Laryng. & Otol. **50**:106 (Feb.) 1935.

Scott gives a historical survey of the treatment of otitic abscess of the brain. He then discusses the pathologic aspects and shows when exploratory intervention is necessary. After discussion of the differential diagnosis of the cerebral and cerebellar abscess, he describes the various types of abscesses, showing that, depending on the structure of the wall of the abscess, enucleation or drainage may be advisable. After describing the surgical procedures, the author states that the first five or six days after the discovery and the evacuation of the abscess are the most critical period. During this time especially it is important to do as little as possible to the wound or to the tubes. Only superficial dressings should be touched. If a patient is not doing well after the first five or six days and yet does not show signs of meningitis the condition is probably the result of edema of the brain. This is more frequent than the retention of pus. It is therefore seldom necessary to reexplore the abscess, but an attempt to save the life of the patient may be made by exposing a still larger area of the brain, the dura mater being divided to permit herniation of the swollen edematous mass, which sometimes relieves symptoms of pressure. In many of these cases the outcome is fatal, owing to gangrenous encephalitis, but even in desperate cases the patient sometimes recovers. The author proposes to try the liberal direct application of magnesium sulphate in the next case with this complication.

EDITOR'S ABSTRACT.

LESIONS OF THE MUCOSA OF THE UPPER PART OF THE RESPIRATORY TRACT AFTER PARATHYROIDECTOMY, EITHER PARTIAL OR TOTAL: RESULTS OF EXPERIMENTS. G. ZANZUCCHI, Arch. ital. di otol. **47**:313 (May) 1935.

Zanzucchi reviews the literature in which the presence of either acute or chronic hypoparathyroidism has been reported as the cause of the development of lesions in the mucosa of different organs. He discusses the "etiopathogenesis" of such conditions as atrophic rhinitis and ozena, which are due to insufficiency of the parathyroids as proved by the results obtained by the author in clinical cases by the administration of parathyroid extract. The author performed experiments on dogs and rabbits to ascertain the effects that parathyroid insufficiency may have on the condition of the mucosa of the upper part of the respiratory tract. He determined that parathyroidectomy, either partial or total, is followed by alterations in the nasal epithelium, namely, atrophy and in some cases disappearance of the epithelium, hyperemia, hemorrhages, atrophy of the secreting cells and parvicellular infiltration of the mucosa and submucosa. The pavement epithelium of the nasopharynx is slightly thinned, except in some cases following either total parathyroidectomy or the removal of three of the parathyroids (two external glands and one

internal), in which the lesions are more noticeable. The seriousness of the lesions of the nasal mucosa is in direct proportion to the intensity of the parathyroid insufficiency, that is, to the time during which the parathyroid secretion is insufficient or absent.

EDITOR'S ABSTRACT.

HISTOLOGIC APPEARANCE OF SCLEROMA. T. S. SCHWEDKOWA-ROSCHE, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:31, 1934.

In a review of the literature Schwedkowa-Rosche demonstrates the great differences of opinion regarding the origin of the Mikulicz cell. It is still a matter of dispute whether the Mikulicz cell develops from a certain type of cell or whether every cell into which Frisch's bacilli enter may become a Mikulicz cell. A case of scleroma in an early stage in which there were characteristic changes in the epithelium of the mucous membrane induced the author to study these changes, and subsequently studies were made in twenty-seven cases. The staining of the bacteria was done with hematoxylin, according to the method of Gram and Weigert. Especially good results were obtained with the modification of Claudius. Schmorl's modification of the Giemsa method was likewise employed for the staining of the bacteria, and the author found it well suited to the staining of Frisch's bacilli, for the method produces a well differentiated stain of the bacilli as well as of the tissues and it is simple to carry out. It was noted that under the influence of Frisch's bacilli Mikulicz cells are formed in the epithelium which are morphologically identical with Mikulicz cells of different origin. The Frisch bacilli penetrate into the nuclei of the epithelial cells and produce dropsical degeneration. Mikulicz cells of epithelial genesis participate directly in the formation of the granulomas that are typical of the scleromatous process.

EDITOR'S ABSTRACT.

BRONCHOGRAPHY. E. HUIZINGA, Ztschr. f. Hals-, Nasen- u. Ohrenh. **37**:87, 1934.

Huizinga points out that the roentgenographic examination of the deeper air passages by means of a contrast medium should be governed by the same principles as those for the examination of other internal organs. He demonstrates the great clinical significance of bronchography in ten cases in which examination by means of iodized poppy-seed oil as a contrast medium disclosed several unusual aspects. In many cases stenosis was detected. A case of carcinoma of the bronchial tube and one in which stenosis was caused by tuberculous granulations are described in greater detail. Frequently, the contrast medium is used for demonstrating bronchiectases or cavities in the lung. The author emphasizes that the changes in the lumen during respiration are significant. He discusses the pathogenesis of bronchiectases and shows that bronchography helps to clarify certain aspects. The method is useful also in investigating the anatomic structure of the entire bronchial tree, for otherwise normal portions of the respiratory tract may change their position and the various pulmonary lobes may have an abnormal position in the thorax. The author illustrates this condition in several cases and shows how bronchography furnishes a clearer picture of the disease process. He found bronchography valuable also in a case of echinococcus cyst of the lung.

EDITOR'S ABSTRACT.

DIAGNOSIS OF TUMORS AT THE BASE OF THE CRANIUM. H. DEMME, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:243 (Nov.) 1934.

Demme stresses the point that the diagnosis of tumors at the base of the cranium necessitates close cooperation between the otologist and the neurologist. Tumors at the cranial base which are demonstrable by palpation or by examination with the speculum are comparatively rare. When such a diagnosis is possible the tumors usually proliferate from the nasopharynx or from the ear toward the base of the brain. In most cases the location and the type of the tumor must be deduced from the symptoms it produces in the nervous system, at the bony base of the

cranium or with respect to the blood vessels. The local symptoms, which are produced directly by the pressure of the tumor on the cerebral nerves or on the central nervous system, have the greatest diagnostic value. But it is sometimes difficult to differentiate them from the so-called distant symptoms, which are produced by indirect pressure on distant portions of the central nervous system and eventually by counterpressure on the bony cranial wall. Then there are the general symptoms of cerebral pressure, which result partly from an increase in the volume of the cranial contents as the result of the growing tumor, partly from the so-called cerebral swelling and partly from disturbances in the drainage of the cerebrospinal fluid. The most important local symptoms of tumors at the cranial base are disturbances referable to the cerebral nerves. Tumors of the anterior cranial fossa frequently impair the olfactory perception or cause choked disk, while those of the middle cranial fossa result in disturbances on the part of the trigeminal or of the abducens nerve. The most important of the syndromes due to tumors of the posterior cranial fossa are caused by those of the cerebropontile angle: impairment of the acoustic and vestibular nerves and paralysis of the facial and abducens nerves. Disturbances of the caudal group of the cerebral nerves of the posterior cranial fossa are comparatively rare. By exerting pressure on the central nervous system tumors at the base of the cranium may also produce symptoms in various portions of the brain. Tumors in the anterior cranial fossa may produce symptoms in the frontal portion of the brain, and those in the middle cranial fossa may involve the temporal lobes. Disturbances in the pyramidal tracts may result when the medulla oblongata receives pressure from below. In pointing out that the distant symptoms may make the topical diagnosis difficult the author stresses the necessity of extreme precaution in interpreting paralysis of the abducens nerve as a local symptom. Roentgenographic examination is of special significance in cases of tumor at the base of the cranium, for there results frequently a roentgenographically demonstrable erosion of the bone. After an evaluation of the changes in the cerebrospinal fluid shown by encephalography and ventriculography, the author discusses the differentiation of a tumor from such conditions as basal syphilitic meningitis, tuberculous meningitis, cysticercosis, lymphogranulomatosis and carcinosis or sarcomatosis of the meninges.

EDITOR'S ABSTRACT.

FREQUENCY OF LUPUS VULGARIS OF THE UPPER RESPIRATORY PASSAGES AND ITS OCCURRENCE IN CONNECTION WITH PULMONARY TUBERCULOSIS. C. EBSKOV, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:281 (Nov.) 1934.

Ebskov reviewed the histories of 823 patients with lupus. He determined the frequency of the condition in the various localizations on the mucous membranes and found that the cases of lupus restricted to the mucous membrane constitute almost 10 per cent of the total number. He observed that cases of primary, isolated lupus of the larynx were more frequent in this material than was indicated by other statistics. In determining the frequency of complicating pulmonary tuberculosis in cases of lupus of the mucous membranes, the author found that it is not greater than with other forms of lupus. He discusses the cause of this, stressing particularly the significance of the immunobiologic reaction. Further, he investigated whether a parallelism exists between the extension of lupus on the mucous membranes and the frequency of complicating pulmonary tuberculosis. Without leading one to a definite conclusion, his material seems to make such a parallelism appear probable.

EDITOR'S ABSTRACT.

Society Transactions

AMERICAN LARYNGOLOGICAL ASSOCIATION

CHARLES J. IMPERATORI, M.D., *Abstract Editor*

Fifty-Seventh Annual Congress, Toronto, Canada, May 29, 30 and 31, 1935

ADDRESS BY THE PRESIDENT OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION, DR. DUNBAR ROY, Atlanta, Ga.

Fellow Members and Colleagues: I am sure I voice the sentiments of our membership when I say that our meeting today within the borders of our sister republic is one of extreme pleasure. An invisible boundary line separates these two great countries but there is not even the semblance which separates the good relationship between the members of this organization and that of our Canadian colleagues.

Allow me to express to this society my deep appreciation of the honor which I hold today as your presiding officer.

Drs. Delavan and McCoy have given you the history of this honored society with its interesting associations, reading as it does almost like the biography of a family tree.

Mosher and Dean have told you of the uncertainties which beset the undergraduate of today and how the teaching of rhinolaryngology will be best accomplished in all the medical schools of the future.

Packard and Shambaugh have given us some of the problems which must be faced by those who are now practicing in the field of laryngology.

Norvall Pierce has told you of the advanced requirements which should be demanded from those seeking entrance into our specialty.

Coakley has given you an outline for the teaching of rhinolaryngology, while Coates has instilled into us the ideals which should permeate the membership of the American Laryngological Society. In fact, every past president of this association has discussed with you the clinical and scientific advancements which have been made in our specialty, has given you historical data from our past record, indulged in sentiments of professional loyalty and imbued you with those traditional instincts which are the very elements of our success.

Some of you gentlemen will no doubt remember that historical meeting in 1918, on the fortieth anniversary of this society, when Dr. Solis-Cohen was elected honorary president. He began his address with these words which I have always considered most suitable as characterizing the qualities of our membership:

"The American Laryngological Society was conceived in the arms of brotherly love, was born in the lap of professional comradeship, was nourished in the milk of emulatory kindness and has grown to vigorous maturity in a communal regard of its entire membership, its useful work in the cause of laryngology, medical progress in general and the interests of humanity."

The last words compel us to realize that this society cannot be separated as a specialty from the general field of medicine, for we are compelled to know that rhinolaryngology is an integral part of medicine in general. Those economic conditions and changes which affect the one must also affect the other.

The study of endocrine disturbances and that of allergy in its various forms are now in their infancy. What rôle they will play in the future of rhinolaryngology is a problem yet unsolved. Every day in our practice we see influences which must be attributed to these mysterious glands. Radical surgical intervention

is becoming less frequent while hygiene and diet are rapidly asserting their importance.

Economic upheavals have been disturbing the whole world, and we cannot expect the medical profession to be free from these disturbances. Individual initiative seems to be giving away to governmental interference. Just how far these social disturbances will affect our profession, it is difficult to say. Never before has it been more important than at present for the whole medical profession to stand united on some bulwark which will counteract these proposed changes whose object is to undermine the practice of our profession.

As I have said before, every specialty is an integral part of general medicine, and it is just as much our duty to uphold the integrity of our profession as it is for the internist, the general surgeon, the gynecologist, the pathologist or the specialist in any other branch of medical science. Changes must come but let us not lower the standards.

In this utilitarian age how seldom do we remember those whose genial smiles and cheery words added much to the success of our meetings.

Every people has its heroes, all perilous callings have theirs, and in our profession they are unnumbered. So many who die today obscure with their fame the dead of yesterday. No towering shaft or storied window proclaims their deeds to posterity. But let not the departed members be forgotten. Their names are familiar to all of us. The record of their deeds is sealed in books never to be opened save by ourselves and by many of their fellow men whom they served in life. By these they will and must not be forgotten, but to many their deeds will remain unknown.

"Those things which we keep, we lose. Those which we give away, we keep forever."

Nothing is truer than these words in their application to the medical profession. It is what we have given away as our clinical experiences that will make us live forever in the transactions of this society and in the memory of our fellow members.

VARIOUS PROBLEMS OF RESEARCH CARRIED ON IN THE DETROIT PUBLIC SCHOOL SYSTEM. DR. BURT R. SHURLY, Department of Special Education, Detroit.

Research in the Detroit Public School System concerns itself with the following: (*a*) stutterers and stammerers (a school for the correction of defects of speech has been in operation for twenty-five years); (*b*) the blind and sight saving; (*c*) the deaf; (*d*) the crippled; (*e*) the epileptic (a school and clinic for epileptic children); (*f*) children with endocrine disturbances (a clinic); (*g*) laboratory research; (*h*) children with psychologic difficulties (a clinic); (*i*) retarded children and behavior, and (*j*) tuberculous children (open air school and open window rooms).

DISCUSSION

DR. SECORD HERBERT LARGE, Cleveland: I should like to ask what percentage of the children who are submitted to the tuberculin test give positive reactions. I have understood that practically 100 per cent show positive reactions.

DR. FRANK ROBERT SPENCER, Boulder, Colo: I understood you to say something about laryngeal tuberculosis, and I wonder if you would repeat the percentage. I understood you to say 15, but that must be too high.

DR. BURT R. SHURLY, Detroit: Answering Dr. Large, we find that 1 of every 450 high school children has active tuberculosis and that the percentage for the high school girls remains the same. The colored population brings it up a bit. We have 110,000 colored persons in a population of 1,500,000. Hospitalization has been necessary, and there is a welfare problem connected with tuberculosis which has become acute.

Answering Dr. Spencer, the statistics of this hospital, which is for advanced cases, shows 15 per cent through a period of ten years.

A Syndrome of Pain and Paralysis Arising from Infections of the Prevertebral Space. Dr. A. W. Proetz, St. Louis.

The prevertebral space lies behind the retropharyngeal space and is separated from it by the thin prevertebral fascia. Many pharyngeal and retropharyngeal infections occur which are not purulent and do not produce abscesses but occasion inflammatory processes of varying extent.

Inflammation in this space may account for the following symptoms, which are sometimes clinically associated: (1) deep pain, as of a muscle spasm, an inch (2.5 cm.) to one side of the spinous processes anywhere between the seventh cervical and the third thoracic vertebra, with stiffness of the muscles in the painful area; (2) futile attempts to hold the head in some position that will relieve the deep cervicothoracic tension; (3) radiation of the pain to the arm, involving any or all of the branches of the brachial plexus; (4) weakness and paralysis in various degrees, the result of brachial neuritis; (5) occipital pain and tenderness; (6) a sore spot in such proximity to the esophagus that a bolus of food passing down the tube orients it by increasing the pain; (7) inflammation of the pharyngeal lymph tissues (or a history of a recent acute infection of these tissues); (8) absence of fever or other severe systemic effects.

DISCUSSION

Dr. John F. Barnhill, Indianapolis: I must admit that I have seen few cases such as the doctor has described, unless one admits that the many cases of stiff neck commonly called rheumatic should be classed with these cases.

It is clear to any one who makes such cross-sections as Dr. Proetz has exhibited that there are only a few regions through which pus and inflammation will travel.

Instead of using the air pressure, as Dr. Proetz has done, one may use the finger, and it almost falls into these spaces which the doctor has spoken of.

Dr. A. W. Proetz, St. Louis: When you begin to look for this syndrome, you find it to be a little more frequent than you imagine, especially as represented by the symptom of pain on swallowing. Patients complain of a sore throat and of the tenderness between the shoulder blades.

Dr. Burt R. Shurly, Detroit: Did you use diathermy?

Dr. Proetz, St. Louis: I am not prepared to say anything about diathermy. I am applying heat and massage as advised by the orthopedist, who admits that heat is probably not more effectual than anything else he might suggest.

Branchial and Thyroglossal Cysts and Fistulas. Dr. J. M. Brown, Los Angeles.

This paper presents the embryologic facts of the development of the branchial apparatus and the theories prevailing in regard to the resulting anomalies. The clinical aspects, differential diagnosis and treatment are taken up, and five cases are reported, arranged according to the location of the anomaly from the zygomatic area in front of the ear, through the parotid region and the anterior cervical area, to the site of the true thyroglossal cyst opening in the midline of the neck. Seventeen other cases in which the condition was treated by operation at St. Vincent's Hospital in Los Angeles are reviewed.

DISCUSSION

Dr. Thomas E. Carmody, Denver: I have seen four cysts of this kind in the last year, two branchial cysts, both on the right side, and two thyroglossal cysts. The branchial cysts were in a woman of 22 and a boy of 3; the thyroglossal cysts were in a girl of 16 and a man of 54.

Dr. Brown speaks of one thing here which leads me to say that the man of 54 years complained a great deal of pain in the larynx on swallowing, and of hoarseness.

A thyroglossal cyst sometimes is found in front of the hyoid bone, through the bone or at times posterior to the bone. In operating it is necessary, in order to get all of the cyst, to remove the bone, coring the tract out up to the foramen caecum. The idea of putting a purse-string around the end of the fistula is good. There will not be any recurrence if the cyst is completely removed.

In the case of the thyroglossal cyst care must be taken, however, that you have some other thyroid tissue because, in coring it out, you may remove all of the thyroid gland which the patient has.

Dr. John F. Barnhill, Indianapolis: I wish to emphasize what Dr. Carmody has just said, that this is largely a laryngologic problem. It has been rather amazing that laryngologists have been so slow in taking up certain things that come squarely in their fields.

Nearly every thyroglossal cyst I ever saw was not a cyst when the patient came to me but a leaky neck; some one had operated on it previously.

Dr. Charles J. Imperatori, New York: Not many years ago I presented before the New York Academy of Medicine a case of branchial cyst of the larynx. This cyst intruded itself into the ventricle of the larynx. The patient was 51 years of age. The method of removal was by thyrotomy. The woman is entirely well, and there has been no recurrence of any of the tissue from the branchial cleft.

My experience with thyroglossal cysts has been that if a laryngoscope is used to press the tissues outward, as suggested by Dr. New, the dissection is greatly facilitated.

Dr. Edward Cecil Sewall, San Francisco: I had an experience with one that was rather unusual and taught me a lesson. A patient was referred to me by a physician for removal of the tonsils and adenoids. This was a number of years ago. I rather foolishly determined to operate without examination, and on opening the mouth I discovered the cyst at the base of the tongue; the condition had been diagnosed as hypertrophied tonsils and adenoids.

Dr. Gordon Berry, Worcester, Mass.: I want to speak a word for Carnoy's solution. This solution can be injected into a fistulous tract, and it will reach the entire tract. This is much simpler than the radical open procedure when there is a long narrow fistulous tract. In such a case Carnoy's solution should at least be tried. It consists of ferric chloride and alcohol.

Dr. J. M. Brown, Los Angeles: Carnoy's solution consists of: absolute alcohol, 6 cc.; chloroform, 3 cc.; glacial acetic acid, 1 cc., and ferric chloride, 1 Gm.

A Malignant Laryngeal Growth Implanted on Tissues the Deeper Layers of Which Were Infected with Trichinae. Dr. Charles J. Imperatori, New York.

A patient 60 years old had a laryngeal growth, clinically a carcinoma, localized to one vocal cord. A biopsy was done. The report from the pathologic laboratory was that the growth was an epidermoid carcinoma, grade 2. A week later, under local anesthesia, a thyrotomy was done and the involved cord and adjacent tissues, including most of the arytenoid muscle, were removed. Careful examination of the cord and adjacent tissues showed no carcinoma, the biopsy evidently having removed the malignant portion, but trichinosis of the muscles of the larynx was easily demonstrated.

This is rather an uncommon combination of pathologic findings.

Bilateral Abductor Paralysis of the Larynx Caused by Injection of Tetanus Antiserum and Subsequent Stenosis of the Larynx Due to Perichondritis. Dr. Charles J. Imperatori, New York.

A young man 26 years of age was admitted to the New York Post-Graduate Medical School and Hospital on March 31, 1932, with a compound fracture of

the tibia and fibula. The accident had been sustained the previous day while he was repairing an escalator in the subway. He had been taken to the Lincoln Hospital and from there transferred to Fordham Hospital, and eventually was brought to the Post-Graduate Hospital.

While he was in the ambulance, some serum was injected, the exact type of serum not being known. He was operated on by Dr. J. J. Moorhead on April 4, and at that time was given tetanus antiserum and Clostridium Welchii antiserum. On April 10 he was again operated on and received gangrene antiserum. These injections were all preceded by proper observations as to desensitization.

On April 10 trismus developed followed by almost complete paralysis of all the muscles of the body, with semiconsciousness. By May 8 a diagnosis of tetanus was arrived at bacteriologically. The injection of tetanus antiserum was continued, and in all he received 90,000 units. By June 15 he was in sufficiently good condition to leave the hospital.

However, within seven days he returned, stating that he had had some difficulty in breathing for the past three days. There was some degree of edema of both arytenoids but the vocal cords and the arytenoids themselves did not move, the cords being in the median position. His disability was marked, and there were marked efforts on the breathing and retraction of the supraclavicular and substernal spaces.

A tracheotomy was done that afternoon. He wore the tracheotomy tube until April 1933. During this period the tube was replaced with a smaller one, so that eventually he wore a plugged one year old tube.

During that time movement was reestablished in the right arytenoid and right cord. There was no movement on the left side, and there was definite evidence of perichondritis of the arytenoid.

He remained in good condition until Nov. 15, 1934. Then he was seen again, and there was considerable retraction in the conus elasticus with distortion of the larynx on the left side, mainly located in the left cord, ventricular band and arytenoid. The conus elasticus was so contracted that a 5 mm. bronchoscope could not be passed. He was retracheotomized.

Since that time his larynx has been dilated regularly so that now it is possible to pass a no. 42 French Jackson direct dilator. He is still wearing the tracheotomy tube.

Few cases have been reported in which the larynx has been involved following the therapeutic injection of serum. Roger, Prévot and Wahl and Roger and Brémond reported two cases of laryngeal paralysis following the injection of tetanus antiserum (*Rev. d'oto-neuro-opht.* **12**:419 and 423 [June] 1934). Two other cases have been reported, one by Lavarand and another by Shanwecker.

Usually accidents of this type following the therapeutic injection of serum involve a brachial plexus, and the resulting condition is of the polyneuritic type. It is exceptional that localization occurs in any of the cranial nerves.

SURGERY OF THE NECK AS IT CONCERNS THE OTOLARYNGOLOGIST. MR. NORMAN PATTERSON, London, England.

The paper deals with unusual tumors of the pharyngeal region and their removal via the cervical route; acute and chronic infective processes; diseases of the thyroglossal tract, with embryologic and surgical considerations, and branchial fistulas and cysts, their origin, diagnosis and treatment.

PARALYSIS OF THE LARYNX: A CONSIDERATION OF SEMON'S LAW. DR. CHARLES J. IMPERATORI, New York.

In many persons the arytenoid muscle is innervated by the superior laryngeal nerves. In no way does this suggested mechanism of continued adduction interfere with Semon's law. This law deals entirely with the abductor fibers of the recurrent laryngeal nerves in that they become affected sooner than the adductor fibers.

Lemere has shown that the abductor muscles have more lipoid granules in them than the adductor muscles have and that they are more susceptible to trauma.

Total paralysis, so-called, with the vocal cords in the cadaveric position, seems to consist of paralysis of the posterior crico-arytenoid muscles and innervation of the arytenoid muscle by the recurrent laryngeal nerves.

A sustained midline position of the cords would result from paralysis of the posterior crico-arytenoid muscles and innervation of the arytenoid muscle by the superior laryngeal nerves. The arytenoid muscle assisted by the cricothyroid muscles, both innervated by the superior laryngeal nerves, would sustain the cords in the position of adduction.

Clinically this appears to be so, for in abductor paralysis, with the cords in adduction, there are considerable relaxation and lessening of the dyspnea when the superior laryngeal nerves are blocked by an injection of procaine hydrochloride or alcohol.

DISCUSSION

Dr. Samuel Iglauer, Cincinnati: We should like to hear from you, Dr. New.

Dr. Gordon B. New, Rochester, Minn: The suggestion Dr. Imperatori has brought up regarding the anatomy and etiology of this type of paralysis is interesting.

Years ago, in doing work on animals, my associates and I came to about the same conclusion, though we could not pin it down. There are so many loopholes in paralysis of the larynx that one cannot say much as to the exact etiology of the condition.

In studying cases of goiter immediately after operation and twenty-four hours later one sees some interesting pictures that are difficult to harmonize with some of the things one was taught years ago. The fact that immediately after an operation for goiter in which both recurrent laryngeal nerves are injured the cords are found in the cadaveric position and then within two months they are seen fixed in the midline does not fit in with one's teaching. Just how to explain that is difficult.

There is another group in which the cords go into the cadaveric position. Why, no one knows.

I should like to ask some of the older men who have been studying such cases for years how many they have seen in which Semon's law was definitely followed when the cords have been in the adductor position, the midline position and then the abductor position.

I have not had the opportunity of studying such cases. I have seen only the other type, that is, cases in which the cords have changed from the cadaveric to the midline position.

Dr. Henry Hall Forbes, New York: I think that is an important point. We should impress on those in charge of clinics where operations on the thyroid are being done that the larynx should be examined before operation. Many interesting conclusions will thus be arrived at.

Dr. D. Crosby Greene Jr., Boston: I think there is still another possibility to account for the abductor position of the cords after resection of the recurrent laryngeal nerves.

Krauser mentioned that in certain persons the external branch of the superior laryngeal nerve supplies the lateral muscle. The arytenoid muscle completes the approximation of the cords.

Both Pearsall and Krauser have described a twig of the superior laryngeal nerve going to the lateral crico-arytenoid muscle, which is an adductor muscle. That would partially explain it.

Dr. Isaac D. Kelley Jr., St. Louis: Cutting the laryngeal nerves in a number of dogs has resulted in some rather interesting phenomena. If the two recurrent laryngeal nerves are severed at the same time the dog breathes quite well, at least for a time. The vocal cords go into the cadaveric position and remain in

that position for a longer or shorter time, but inevitably they gradually approach the midline and the dog has a great deal more trouble in breathing until eventually a disaster happens and causes the death of the animal, which I attribute to the anesthesia of the under surface of the larynx in the upper portion of the trachea, for the recurrent laryngeal nerve supplies sensation to the under surface of the larynx and the upper part of the trachea.

I do not think one can doubt that the partial innervation of the larynx comes from the superior laryngeal nerves. Tension of the cords is produced by the cricothyroid muscles.

If one considers the extrinsic muscles of the larynx one knows that a pull on the sternothyroid muscle will pull the thyroid forward and downward; also that the longitudinal fibers of the esophagus, with the superior laryngeal nerve innervation, plus the education of the external muscular innervation, produce tension or adduction of the cords.

In bilateral paralysis of the postici muscles there is complete adduction of the cords. Tracheotomy is necessary. Why does one encounter complete abductor paralysis? If one studies the evolution of the larynx, as Mr. Negus of London has done, one finds that in the lung-fish there is a large constrictor muscle which closes the larynx. There was a need only for a constrictor muscle because voluntarily, owing to the elasticity of the airway, it opened when the constriction was released, but when the cartilaginous larynx was built, it split up that original laryngeal constrictor. Mr. Negus has proved that conclusively.

In the study of embryology it is interesting to find that in the human larynx, in its developments, that same constrictive bundle is there, as it was in the lung-fish. One finds that as this innervation evolves with the development of the larynx, on the old, original constriction innervation or flexor function there is superimposed an abductor innervation or elevator function; in other words, the old neurologic law that in neurospinal diseases the first function lost is extension or abduction applies to the larynx.

Now, Semon was never able to explain that because he had not studied the evolution of the larynx from its original form in the lung-fish to the present. It was simply missed until Mr. Negus found it. Mr. Negus explained it from an anatomic basis and said that Semon's law was inviolate.

DR. E. ROSS FAULKNER, New York: I want to say a word about the analogy between a spasm of one group of muscles and a paralysis of the opposite group. The discrepancy in these things, I think, often occurs from the fact that one may observe an adductor spasm which practically gives the same symptoms as an abductor paralysis.

From a case I have seen I believe that can happen. A laryngologist sent me a patient from out-of-town. On three occasions he had been called to see this woman in a severe attack of dyspnea, and he contemplated a tracheotomy, but each time she escaped. He examined her larynx during the attack, and the cords were tight together in the midline.

When I saw her she had abductor paralysis of the cord on the left side, with the right cord moving fairly freely. Unquestionably, at the time he saw her, both cords were quite close together, as he was a reliable observer. She must have had an adductor spasm on the right side as well as an abductor paralysis on the left side. I have failed to follow her subsequent history, but this was the condition of the patient at that time and it shows how confused one can be between a spasm of one group of muscles and a paralysis of the other group producing the same symptoms.

DR. MERVIN C. MYERSON, New York: A year ago I worked with a large number of cows' and lambs' larynges, and I had the good fortune to have an anatomist advise me that the cow's larynx was a fine thing to dissect if one wanted to understand the human larynx. When one dissects it one is impressed with the fact that the fibers of the superior laryngeal nerves go to all the muscles of the larynx, and if one gets a large larynx from a male adult human being one can trace fibers of the same description to the muscles of the human larynx.

The explanation of the phenomenon that has been discussed this morning may lie in the possibility that the motor fibers of the superior laryngeal nerves which innervate the muscles of adduction are more powerful than the fibers that influence the muscles of abduction, and so there is the midline position. That would be more plausible if one could prove the efficacy or potency of the fibers of the superior laryngeal nerves in the adductor muscles.

Dr. Charles J. Imperatori, New York: I want to thank Dr. Kelley for his demonstration and say that a great deal of this has been explained by Burger in the Semon Lecture for 1933.

Lemere seems to have attempted an explanation by etherization of young animals and found that the occurrence of the various flexor and extensor paralyses depends on the age of the animal and the length of the anesthesia. I am inclined to feel that it is a question of an unusual innervation and that one observes the midline position in patients who have this different innervation.

Effects of Drugs on the Ciliary Activity of the Mucosa of the Upper Respiratory Tract. Dr. Dean M. Lierle, Iowa City.

The effects of certain drugs on the cilia of the mucosa of the antrums of living rabbits were studied. A new method of observation was used which closely approximates the natural conditions existing in the sinus. These results are compared with those previously reported under the same title (Lierle, D. M., and Moore, P. M.: Arch. Otolaryng. **19**:55 [Jan.] 1934) in which some of the determinations were made on extirpated human mucous membrane and others on the nasal mucosa of freshly killed guinea-pigs. From this comparison some conclusions are drawn as to the protective qualities of normal mucus, and some clinical considerations are presented.

Ossification of the Laryngeal Cartilages: Its Relationship to Some Types of Laryngeal Disease. Dr. H. M. Taylor, Jacksonville, Fla.

There is ample evidence that age is a factor in the ossification of the cartilages of the larynx, though the age at which ossification occurs is extremely variable. Certain morbid conditions seem to be factors in determining the course and extent of these cartilaginous changes. While calcification and ossification of the laryngeal cartilages may to some extent be normal, the laryngologist should endeavor to recognize early pathologic ossifications. Roentgenologic examination of the larynx is of paramount importance in the study of this subject.

DISCUSSION

Dr. Frank Robert Spencer, Boulder, Colo.: Some years ago I undertook a roentgen study of the larynx of each patient in the hope that something could be learned about laryngeal pathology. Roentgenography was used first for the study of patients suffering from laryngeal tuberculosis. A few other patients with syphilis and arthritis were also examined by the radiologist. The films failed to show the lesions of tuberculosis as I had hoped they would, but they showed ossification of the cartilages in some of the patients. A patient with extensive syphilis of the larynx and another with extensive chronic arthritis of many large and small joints, including the crico-arytenoid joints, also showed ossification.

The few patients with laryngeal tuberculosis who showed ossification had areas of calcification much like those sometimes found in the lungs. These patients, however, had suffered from laryngeal tuberculosis in mild form for a number of years.

The patient with syphilis showed a more or less uniform ossification, and the one with arthritis showed ossification of the cricoid and arytenoid chiefly.

The late Dr. William V. Mullin found slight ossification of the larynx in several patients at Asheville, N. C., while he was stationed there when in the Army. All of these patients had suffered from pulmonary but not necessarily from laryngeal tuberculosis.

He believed, as I did, that ossification was not frequent enough to be important, but I cannot agree with the statement made by one of the authors quoted by Dr. Taylor that ossification does not take place in the larynx of the tuberculous patient.

Dr. Joseph C. Beck, Chicago: The point regarding vascularization aiding ossification should be borne in mind in connection with the work of Wittmaack on the capsule of the labyrinth. It must be something other than vascularization, whatever that may be. It may be purely local, though I believe it is a general condition that aids in this premature ossification.

The question of radiosensitivity is important in connection with the stimulation of cartilage. Studies should be made of the larynx before and after treatment when extensive treatment with the x-rays has been given, and a watch maintained for the development of new bone.

A patient was referred to me because he was suspected of having a carcinoma and required immediate tracheotomy. He was studied roentgenographically and showed a definite outline in the lateral view of the thyroid, with an area of rarefaction, like a sequestrum.

He gave a history of having had, seven years previously, severe typhoid fever. This man had typhoid fever with an accompanying perichondritis and subsequent expulsion of a sequestrum.

Dr. John F. Barnhill, Indianapolis: I have seen a great many larynges in the dissecting room. Most of these were from adults, and I should say that practically all were ossified in some part. It is rather amazing that anybody should be found at 103 years of age in whom the cartilage is not ossified.

Dr. Taylor speaks of an interesting thing in regard to mistaking what he found for a foreign body, that is, mistaking ossification for a foreign body.

Dr. Chevalier L. Jackson, Philadelphia: There is just one point I should like to emphasize in connection with the differential diagnosis of calcifications, which are more properly called ossifications, and bones in the hypopharynx and upper part of the esophagus. I have heard the differential point of the level brought up—that bones as foreign bodies occur at a lower level than ossifications, these isolated spots of ossification which may be mistaken for bones, but that, while this is true in 90 per cent of the cases of bone as foreign body, it does not hold in all cases.

We have collected three or four examples of bones occurring as foreign bodies at the level of the cricoid cartilage.

Dr. Edward Chamberlin and I have studied a number of cases and we have examples in which that point was brought up as final—that the observation in question could not be a bone as foreign body because a bone lodges a little lower —and we know that they generally lodge below the cricoid level but can lodge at exactly the same level as the spots of ossification in the cricoid cartilage.

Dr. Frederick M. Law, New York: Speaking of this from a roentgenographic standpoint, one finds little to say, but in defense of the roentgenologist I should state that my associates and I have observed and reported shadows in the thyroid for many years as ossifications. We have not attached great importance to the shadows because we considered them simply in a differential diagnosis of foreign bodies.

However, if the calcification is extensive there is no difficulty. If it is minute as it often is, and forms a linear shadow, in the presence of the history of a foreign body the roentgenologist is confronted with a difficult problem.

Dr. Samuel Iglauer, Cincinnati: There are just one or two points that Dr. Taylor did not mention, and one is ossification in the trachea. It can be shown in the x-ray film occasionally that the tracheal rings are ossified, and that has some surgical and clinical importance. In the literature one finds an occasional reference to ossification of the epiglottis, though I think the condition is exceedingly rare.

I recall, too, that in one x-ray film calcification (one may call it that) was shown along the tracheotomy tube which the patient had worn for a long time; so one can have ossification in the soft tissues after a tracheotomy.

I think Dr. Taylor has made an error in trying to have the exception prove the rule. He had a 103 year old man without ossification and a boy of 14 with considerable ossification, but those are the exceptions, and, as a rule, ossification, from what I have read and seen, follows a rather general plan according to age.

Typhoid fever was also mentioned. It will be recalled that in patients who have had typhoid fever there occasionally is observed an ulceration on the back wall of the cricoid cartilage, and this is supposed to be due to the patient's lying in a stupor with the cricoid cartilage pressing against the vertebral column.

Dr. Lee Wallace Dean, St. Louis: It might be well to call the attention of the members to the fact that ossification may take place in the external ear as well as in the larynx. No metabolic disturbances have been detected.

Dr. H. M. Taylor, Jacksonville, Fla.: Dr. Spencer brought up the point relative to the effect of tuberculosis on the larynx. According to the literature which I reviewed, it seems that in laryngeal tuberculosis ossification tends to be retarded.

Dr. Beck brought up the question as to otosclerosis and its possible relationship to ossification of the laryngeal cartilages.

Dr. Barnhill spoke of the foreign body. It was of interest to me in the literature reviewed that in not one of the eight cases of cartilages expelled was the condition diagnosed beforehand.

Dr. Iglauer's discussion was interesting. In the cases I referred to I could not find any evidence of ossification of the epiglottis, but in a case which I reviewed in the literature mention was made of ossification around the tracheotomy wound.

I agree with Dr. Dean. I think it would be interesting to have a roentgen study made of this patient's cartilages as well as of his ear.

The Response of Allergic Phenomena to Ionization. Dr. A. M. Alden, St. Louis.

The paper gives the history of ionization, or iontophoresis, in the treatment of nasal disorders. It calls attention to the use of ionization for the relief of allergic symptoms and describes the methods of treatment.

It has been definitely demonstrated by sections from the noses of both animals and patients following ionization that no permanent damage occurs to the nasal mucosa as a result of this treatment.

There is a critical analysis of the results obtained in over seven hundred bilateral ionizations for the relief of various allergic symptoms. The relationship of ionization to the immunologic factors involved in allergy is discussed.

DISCUSSION

Dr. William B. Chamberlin, Cleveland: I want to ask Dr. Alden if in those cases complicated by polypi these were first removed and ionization attempted after that.

Dr. Bernard J. McMahon, St. Louis: We have just heard a brilliant paper on the results obtained from ionization in patients, and, like everything that is very good, I think one should question whether or not it is not just a little too good to be true. With that idea in mind I conducted some experiments on dogs. I started them two years ago, and certain changes were prognosticated. During the past year I continued the experiments in order to find out whether there were not changes which would be significant and from which one could prognosticate the final outcome of ionization.

Of course, this was studied in dogs, because I should have been reluctant to remove a large part of a human turbinate bone in order to get a complete picture; also, I should have been reluctant to remove a normal turbinate to compare with the pathologic turbinate.

I took dogs and in them ionized the solutions that were used in patients with the electrode that is used in patients. I used 2.5 milliamperes of current for

twenty minutes. The physics of this problem were confirmed by Dr. Bunch and Dr. Eberhard.

I think the question which one has to determine is whether or not the extensive fibrosis of the tunica propria of the nose is to be desired. That is something which one expects to help the normal function of a nose. Extensive fibrosis means compression of the glands and depression of the secretions, and it leads to further fibrosis because of cutting down the blood supply; cutting down the blood supply also causes osteofibrosis and leads to—at least one should keep in mind the possibility if not the probability of it—leads to various nerve pains, neuritides, hyperesthesias and uncontrollable nerve pains as a result of pressure on the nerves of the turbinate when the fibrosis is well established. It will not take place in a few months. It is a matter of time, but, after all, patients have to live with their noses for the rest of their lives, and if the cure is worse than the disease, I think one should give that fact serious thought before one applies the cure.

Dr. Henry M. Goodyear, Cincinnati: If one gets results simply from coagulation of the surface of the mucous membranes of the nose, why cannot one do it by some local application?

I have had a few patients who apparently got relief on a single application of 100 per cent phenol.

I have a number of patients in whom I have used 10 per cent silver nitrate who report results which I think compare rather favorably with those obtained by ionization.

One also knows that one may relieve a patient with hay fever by injecting a 50 per cent alcohol solution, and that many get relief even when the inferior turbinates alone are treated with this solution.

It would be interesting if the doctor would try to determine which is the sensitive area for hay fever. Is there any particular part of the nose which will respond and produce the result one wants without treating the entire membrane of the nose?

Dr. Harold G. Tobey, Boston: My results from ionization in the treatment of perennial vasomotor rhinitis have been very good. Incidentally, I have used ionization in a few of the patients with hay fever with startling results.

I should like to ask: What is the mechanism of ionization?

A true diagnosis of an allergic condition in the nose, in the manner that Dr. Alden has brought out, is essential.

Dr. Ernest M. Seydell, Wichita, Kans.: It is true that one does get phenomenal results, particularly with seasonal hay fever, by this method. With allergic rhinitis, however, I have had a few failures. I do not use it in any cases of allergic rhinitis unless I fail with exclusion diets.

Dr. Arthur W. Proetz, St. Louis: One knows that an operation on the nose sometimes holds in abeyance a type of hay fever or asthma, and when a patient breaks his arm his asthma may be held in abeyance, and so may his hay fever. It occurs to me the one thing in common is trauma, local or general. However, to test the matter out, last year, during the hay fever season, I took an ossiculectomy knife and made a series of eight punctures on the turbinate and eight more on the septum opposite, straight punctures going down to the bone and producing minimum trauma. Whether it was the effect on the vasomotor control or the liberation of tissue juices or what it was I do not know. It is simply a clinical observation, but my successes over a period of a short time, two to three weeks, were about what the successes in the use of the other methods were. I simply put in the observation for what it is worth.

Dr. A. M. Alden, St. Louis: First I shall answer Dr. Chamberlin's question about the removal of polypi. Anything that interferes with complete contact between the nasal mucosa and the electrolyte interferes with the success of the treatment.

Dr. Goodyear spoke about the slough that occurs following ionization. In the observation of more than a hundred bilateral ionizations in patients I have yet

to see the slightest evidence of what might be called a slough. That is the experience of other men who have had adequate experience with this treatment.

Dr. Tobey spoke about the mechanism involved. I do not know what the mechanism is.

Relative to Dr. McMahon's work on dogs, it is very interesting. However, alongside of this my associates and I have had the opportunity to watch carefully for more than eighteen months the noses of patients who have been treated by ionization. When they tell one that they are free from their symptoms they know what they are talking about.

SINUSITIS, ALLERGY AND THE COMMON COLD: A CONCEPTION OF THEIR RELATIONSHIP. DR. EDWARD CECIL SEWALL, San Francisco.

This article will be published in full in a later issue of the ARCHIVES.

OSTEOGENESIS CAUSING OBLITERATION OF THE FRONTAL SINUS: A REPORT OF SIX CASES. DR. S. R. SKILLERN, Philadelphia.

This article will be published in full in a latter issue of the ARCHIVES.

RHINOSCLEROMA: IS IT AN INDIGENOUS DISEASE? DR. WILLIAM B. CHAMBERLIN, Cleveland.

Rhinoscleroma was first described by von Hebra in 1870. For many years it was supposed to be confined to the Balkans and the territory immediately adjacent thereto. More recent reports ascribe sporadic cases to regions throughout Europe as well as South and Central America, especially Guatemala, where many cases have been reported. Hajek feels that such reports may not necessarily mean that the disease is more widespread but that it is more widely recognized. Cases reported by Canfield, Watkins and Figi suggest the possibility of its independent existence in the United States.

Although the bacillus described by von Frisch in 1882 is constant and easily found in tissues and smears, it can hardly be held to be a separate species on account of the transition forms that arise when it is grown on different mediums and the close resemblance to the bacilli of Friedländer and Abel.

Although similar lesions can be produced in animals, notably mice and rabbits, the mode of transmission in man is still in doubt. Roma attempted to reproduce the lesion by innoculating the cheek of a man, while Simoni attempted to reproduce it by placing cotton soaked in the secretions of infected patients in the noses of others. These attempts were equally unsuccessful. Von Schroetter went further and placed bits of characteristic tissue under the skin of his own arm, with no success. The bacillus of von Frisch is not essential to the diagnosis, but the characteristic lesions plus the cells of Mikulicz are necessary.

The present case occurred in a man of 56, a resident of the United States for the past twenty-nine years. Symptoms were first noticed fifteen years ago.

Smears of characteristic bacilli are easily obtained from the nose and pharynx, while stained sections show the organisms within Mikulicz' cells. Characteristic cells are found throughout the sections.

DISCUSSION

DR. RALPH ALBERT FENTON, Portland, Ore.: Some two or three years ago, at a meeting in Los Angeles, Dr. Eugene Lewis presented three cases of rhinoscleroma; in one the lesion was in the throat and in the other two it was in the nose. As I recall it, the patients were all Mexicans.

I should like to ask Dr. Chamberlin whether or not any experiments referable to a filtrable virus as an activating agent for this bacillus have ever been carried on.

MR. NORMAN PATTERSON, London, England: I saw a case many years ago in London and one the other day in Montreal.

Dr. Robert Sonnenschein, Chicago: While at Königsburg, in 1909, where I was assistant for a time, I had the opportunity of seeing many of these cases. These patients came from Silesia, Poland, also Russia. The disease is endemic in these regions. The nasal cases were common in comparison with the laryngeal ones.

Dr. Joseph C. Beck, Chicago: I have had the opportunity of studying this disease with the late Dr. Friedberg. In our treatment we used the x-rays and radium but to no effect.

I had the pleasure of seeing a case of rhinoscleroma here in Toronto. Dr. MacGregor has prepared sections of the tissue, and the bacteria are easily seen.

Dr. John Devereux Kernan, New York: I saw a rhinoscleroma of the nose in a middle-aged Russian Jewess last summer which had been in existence for twenty or thirty years. She had had extensive treatment with the x-rays. The radiotherapy department refused to use the x-rays any more in the case, so I undertook to remove it with a diathermy knife and removed a considerable portion of it.

Tissue sent to the laboratory was reported as carcinoma. This is a case of rhinoscleroma with a carcinoma engrafted on it.

Dr. William B. Chamberlin, Cleveland: In regard to Dr. Fenton's question, I did not find any reference to a filtrable virus.

Now, as to Dr. Beck's question concerning the use of radium: Of course, after cicatrization has occurred, radium, in my opinion, has no effect, or it might produce, if it were used in sufficient quantity, a sloughing effect. It is interesting, too, that in the advanced lesions where cicatrization has taken place one finds little or no evidence of the unibodies in the Mikulicz cells. Those are only in the stage of tumefaction.

As to these cases which have been reported, Watkins' case was one of the first. This was in a colored man who lived in Baltimore and had never been out of the country except on two trips as a sailor to Central America. Another interesting case was the one reported by Canfield. This occurred in a girl, as I remember, 16, 17 or 18 years of age. She was born not far from Ann Arbor, Mich.; however, her parents were from Southeastern Europe, so there are certainly a few reported cases in this country, but none, so far as I know, in native Americans; the patients are all of foreign extraction.

Atypical Trigeminal Neuralgia. Dr. H. W. Lyman, St. Louis.

Tic douloureux, or trigeminal neuralgia, is a definite clinical entity characterized by intermittent paroxysms of intense pain limited to the distribution of the fifth nerve. These paroxysms are usually induced by some slight stimulation of a so-called trigger zone. Resection of the posterior root of the gasserian ganglion affords the only method of securing complete and permanent relief in this condition. However, the term "trigeminal neuralgia" is often used to describe any severe pain in the face, and variations from the typical tic douloureux either in the distribution of the pain or in the character of the attacks are accounted for by using the term "atypical trigeminal neuralgia." Resection of the posterior root in these cases may afford partial or temporary amelioration of the symptoms or no relief. This suggests that with the so-called atypical trigeminal neuralgias there are grouped a number of different pathologic conditions, either in conjunction with true tic douloureux or entirely independent of it. A study of the cases reported here seems to show that in some of them the neuralgia is dependent on irritation of the sphenopalatine ganglion by inflammation in the adjacent sinuses and that the neuralgia can be relieved by treatment of that condition.

DISCUSSION

Dr. Ralph Albert Fenton, Portland, Ore.: I should like to direct the attention of the Fellows to the fact that the sphenopalatine ganglion is a sympathetic

ganglion with sensatory and pain fibers running through it in various directions. Injections made into the sphenopalatine ganglion for pain interrupt the course of pain fibers in various directions, some back through the vidian nerve, and others through perhaps more direct connections to the gasserian ganglion.

As a matter of fact, trophic impulses and sensations which come from the skin are not necessarily carried by the same fibers that carry pain; they may travel by entirely different routes, and it is possible that this explains why the recent posterior sections of the gasserian ganglion have been more successful so far as the comfort of the patient has been concerned and have not resulted in the danger and damage to the cornea which the classic removal of that ganglion used to bring about.

One should also, I think, remember that many of these atypical neuralgias which are discussed in this excellent contribution of Dr. Lyman's may be due merely to turgescence of the posterior end of the middle turbinate against a neighboring high thickening of the septum, and that the difficulty is a somewhat mechanical one which may be activated by disturbances in the sympathetic system at some remote points.

Purely mechanical relief in the nose at that point, namely, the removal of the posterior end of the turbinate and the thinning down of the septum, may be all that is necessary—and preferable to the somewhat dangerous procedure of injecting alcohol into the ganglion.

Dr. Harris P. Mosher, Boston: As you know, we were all under the spell, deeply under the spell of Sluder's gigantic physique. It was dangerous to disagree with him; and we were also under the spell of his magnificent reasoning. He started a furor for this treatment. It was dangerous, as you know, for any one with a headache to get within a hundred miles of St. Louis. It was the same in Chicago, Boston and all the other cities.

We did not get proportionate results so far as numbers go in these cases. The furor subsided and died out, and this paper is welcome because it is so dispassionate and because it straightens things out.

The first point I want to make is that if one is to deal with cases of this type one has to be a neurologist or get in touch with a neurologist whom one can trust.

I should like to provoke Mr. Patterson to get on his feet and discuss this subject. The Atlantic Ocean is a very unequal conductor of scientific information. It is a very quick conductor from West to East, but a rather poor conductor (though it is getting better) the other way around. The furor for the injection of a drug into the ganglion did not cross the Atlantic, and I have heard some adverse remarks about what was happening here. I should like to have the President call on Mr. Patterson and have him enlighten us as to the present status of this problem.

Mr. Norman Patterson, London, England: Well, I am not prepared to discuss the problem without preparation, but in England we never suffered from Sluderitis; in fact, we have always guarded against the enthusiasm, which I think sometimes is very prevalent in this country, for ascribing all such neuralgias to some condition of the sphenopalatine ganglion. We have approached that with a great deal of reticence, and as far as I am concerned I find the treatment of neuralgias of this type extremely difficult.

One comes across a case sometimes which is sent over to one by the neurologist or the neurosurgeon. He demands that one should put one's finger on some particular trigger which is causing these distressing symptoms, but, as a rule, I find a negative condition. In examining the nose one occasionally discovers ethmoiditis, especially disease of the posterior ethmoidal cells or of the sphenoid, which may be responsible for the neuralgia, or again, congestion of the mucosa in the region of the posterior middle turbinate. On the other hand, in nine cases out of ten one reports negative results and the patient goes back to the neurologist or the neurosurgeon.

Some of the patients are treated with great success by division of the root of the same ganglion.

Dr. Arthur Walter Proetz, St. Louis: It seems to me that in the present state of knowledge, if the truth were known, a great many of the pains arising about the face are atypical, or the diagnosis, one might better say, is atypical. Until one knows more about the mechanism of pain, it is bound to be so.

One thinks of the neuralgia as being due to pressure or to intoxication, or, as Dr. Lyman says, perhaps to a mechanical defect from some remote cause, but the fact remains that a sinus membrane which is as thick as a cigaret paper can suddenly stretch to half a centimeter or a centimeter in thickness without causing any pain. There must be terrific mechanical tearing in that instance, yet no pain results.

On the other hand, one sees membranes that do not thicken, in the sphenoid, for instance, which are very painful. One opens them. They look approximately normal, and the pain disappears. One sees ethmoids with extreme hyperplasia. One opens them, sees the hyperplasia and knows that there is considerable pathologic change there. For half an hour the patient has terrific pain, and for the rest of the twenty-four hours he has none, with apparently no change in the appearance of the sinus. The pathologic condition cannot change so quickly as that. Whether it is an intoxication in that case or not, no one knows, but until one finds out whether the pains originate in the surface, in the end-organ or along the trunk of the nerve, most of the pains are going to be atypical.

Dr. John F. Barnhill, Indianapolis: The diagnosis is important. In the past every surgeon who saw a large number of cases of tic douloureux has made the same complaint to the otolaryngologist, namely, that he has not always made a good diagnosis. The surgeon has operated on sinuses, on teeth, on tonsils and on other tissues of the nose and nasopharynx when very clearly there was a tic douloureux present, so the classification which Dr. Lyman made this morning is one that is most excellent and it ought to be given close attention.

It has seemed to me in a number of cases that cocainization of a sphenopalatine ganglion by the ordinary methods is not sufficient. Why? Because in a number of instances the sphenopalatine ganglion lies rather deep and there is intervention of bone in some instances, and in those cases in which it lies a number of millimeters beyond the sphenopalatine foramen the cocaine does not reach it.

Dr. Lyman makes one statement which I wish to correct, namely, that the only means of permanently or satisfactorily curing a genuine tic douloureux is by resection of the posterior root. Any one who injects alcohol into a gasserian ganglion and puts that alcohol directly into the cavity—I mean into the sac which holds the ganglion—will cure that ganglion just the same as if he resected the root, and the amazing thing to me is that more people have not used this method and so made such cures.

Dr. E. Ross Faulkner, New York: I do a submucous resection with removal of the posterior end of the middle turbinate.

I have injected alcohol for tic douloureux in over fifty cases and I have learned enough not to touch the atypical one.

Dr. Henry M. Goodyear, Cincinnati: I should like to ask Dr. Lyman what Dr. Frazier's results were in the ten cases in which he resected the sympathetic plexus above the carotid artery.

I was much impressed with the size of the great superficial petrosal nerve which together with the sympathetic plexus goes to make up the vidian nerve that goes to the ganglion.

I should like to ask Dr. Lyman how he makes an injection into the ganglion.

Dr. H. W. Lyman, St. Louis: There are certain cases of neuralgia with definite disease in the sphenoid or the posterior ethmoids in which the pain responds to cocainization of the sphenopalatine ganglion.

It seems to me that one's knowledge of the nervous system, especially of that in the human being, as based on animal experimentation and clinical observation is about as if one took a moving picture film, cut out individual frames, and by looking at these frames tried to reconstruct the entire reel; as one gets more

and more of the frames of absolute knowledge one is able more clearly to approximate the story told in the film itself.

In regard to the injection of any drug into the ganglion I have believed that the logical point of attack in the treatment of sphenopalatine neuralgia is the diseased sinus rather than the ganglion.

Dr. Frazier reported ten cases of atypical neuralgia in five of which resection of the posterior root was without result, and stated that in only one of these ten cases in which the superior cervical ganglion had been resected and the artery stripped was relief obtained.

THE TREATMENT IN A SERIES OF CASES OF SO-CALLED CARCINOID TUMORS OF THE BRONCHI BY DIATHERMY. DR. JOHN DEVEREUX KERNAN, New York.

This article includes a consideration of the place of origin of these tumors, their growth, their microscopic appearance, their life history, their treatment by diathermy, with a description of the instruments used, and a summary of the results in the ten cases reported.

DISCUSSION

DR. CHEVALIER L. JACKSON, Philadelphia: A young girl had a large tumor removed by thoracotomy. The tumor was regarded as a neurofibroma. It was removed by the posterior approach by Dr. George Muller.

After this operation she was perfectly well for a year or two, and then she began to notice slight shortness of breath without other symptoms. Roentgen examination showed atelectasis of the entire right lung.

By bronchoscopy I found a large tumor in the right main bronchus at the bifurcation, and I thought this would be an excellent case for diathermy.

At the start an attempt was made to remove the tumor entirely by forceps, but a considerable amount of bleeding occurred after the second attempt, so I prepared an 8 mm., full lumen, aspirating bronchoscope, with a channel for an electrode, such as Dr. Kernan has been using, and diathermy was applied three or four times with great satisfaction. It has been possible to visualize the field perfectly and to avoid any damage to the bronchial wall. There is still some tumor in the bronchus.

These treatments have been given at intervals of about ten days and still some tumor remains, but I think it will be possible to destroy the entire endobronchial tumor.

The histology has been just the same as that of the larger extrabronchial tumor removed by Dr. Muller. Partial reaeration of the lung has been obtained. The upper and middle lobes are quite well aerated at present.

DR. LOUIS H. CLERF, Philadelphia: In cases of this type the important thing is the diagnosis. It is amazing how confusing the nomenclature is becoming. Dr. Kernan speaks of this lesion as carcinoid tumor. In a paper read before the American Bronchoscopic Society such lesions were called adenomas. My associates and I have been calling them benign glandular tumors, and we have sent many to Dr. Ewing, who said that many are adenocarcinoma of low grade.

There is much confusion as to the designation, and, furthermore, pathologists are a bit confused as to whether the lesion is benign or malignant. For that reason the bronchoscopist must emphasize in his conclusion what you have already mentioned, the condition of the bronchial wall.

In many of our earlier cases the condition was diagnosed as adenocarcinoma and did not respond to the x-rays particularly. In a number of them I tried fulguration with what I believe were satisfactory results. Then I simply removed them by using blunt forceps, and that is my procedure now. I use the tip of the bronchoscope and forceps. I have treated six cases in that fashion.

DR. WILLIAM B. CHAMBERLIN, Cleveland: I want to ask Dr. Kernan a question: Just why was it necessary to introduce the electrode through a separate

channel? Why could he not have introduced it through the bronchoscope just as well and still have had clear vision?

Dr. Duncan Campbell Smyth, Boston: At the Massachusetts General Hospital we have had nine cases of pure adenoma of the bronchus. As far back as four years ago a patient was considered to have a malignant lesion of the lung and was operated on, the middle and lower lobes being removed. The patient is well today but a later examination of the specimens showed that she had a pure adenoma of the bronchus. The pathologists are agreed that it is an adenoma. They have not seen the growth in any of the cases metastasize, and they call it benign adenoma.

In seven of our cases the condition was preceded by hemoptysis as an early sign, and in four of them there was a pronounced secondary bronchiectasis with atelectasis.

An x-ray film should be made in all cases of hemoptysis.

Dr. Gabriel Tucker, Philadelphia: My associates and I have seen a number of such cases of tumor of the lung, and wondered what the exact diagnosis was. The observations seem to confuse the pathologist just about as much as the bronchoscopist, but one important contribution that the bronchoscopist can make is that he can get the bronchus open so that the atelectasis will disappear.

The patients we have observed have had treatment with x-rays of high voltage and implantations of radon with very good results in a number of cases.

I should like to ask Dr. Kernan what the objection is to the implantation of radon. I have never seen any bad effects and have certainly seen some excellent results in the disappearance of the obstruction in the bronchus.

Dr. John Devereux Kernan, New York: I think the use of diathermy and of the diathermy aspirating tube, is good, because sometimes a little smoke gets in the way and interferes with observation.

In regard to the destruction of the tumor, I am not sure it is necessary to destroy it all. I think that if it is well coagulated so that it shrinks down white the probability is that it will continue to disappear.

As I have said, many call them carcinoids, many call them carcinomas, and many call them adenomas, and the pathologists are by no means agreed as to what they are.

About removing these growths with forceps, I think that is sufficient if the tumor is pedunculated and all inside the bronchus, but remember, I showed you a slide in which there was a considerable portion of the tumor outside the cartilages. I cannot see how forceps could reach that portion.

As for passing the electrode in a separate channel, that is merely for the purpose of keeping it out of the way as much as possible and giving the best vision.

As for the atelectasis, bronchoscopy is very important and effectual in removing the atelectasis. It disappears promptly.

I have no objection to radon.

Cancer of the Epiglottis; Total Extirpation of the Epiglottis by the Laryngofissure Route; Description of the Operation and Report of Cases. Dr. Gabriel Tucker, Philadelphia.

Cancer of the epiglottis may be a highly malignant and rapidly metastasizing affair which quickly involves the base of the tongue if it arises on the upper surface of the epiglottis. However, if it is limited to the under or posterior surface of the epiglottis, well above its base, it is apt to be much more benign.

Such a cancer presented itself and on biopsy was reported to be type 1. It seemed feasible to remove the epiglottis with only a small portion of the ventricular bands. This means an area well beyond the limits of the growth which had not penetrated the cartilage of the epiglottis. The removal was made through a laryngofissure incision, and the true cords were not disturbed. The patient made an excellent recovery and has had no recurrence for two and a half years.

The laryngeal functions were disturbed little, the voice being entirely clear. Slight difficulty in swallowing was experienced.

DISCUSSION

DR. GORDON B. NEW, Rochester, Minn.: Dr. Tucker should be congratulated on using conservative methods in the treatment of the superglottic regions, particularly when the carcinoma is of low grade.

I feel that there are three methods of approach in carcinoma of the epiglottis. In the case of carcinoma of low grade one can do a tracheotomy and by Lynch suspension destroy the upper region by diathermy. In the case of more advanced carcinoma one can divide the hyoid bone, coming down on top of the lesion, and remove it completely. The third method is that of Trotter, with a pharyngotomy.

The type of lesion, of course, must determine the method of treatment. If this had been a high grade lesion the result would not have been so satisfactory.

DR. LOUIS H. CLERF, Philadelphia: It was my pleasure to see this patient at the meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society during January. At that time there was no question about the result having been an excellent one. The patient's voice was apparently normal; there was nothing to suggest a possible recurrence, and I sincerely hope there will not be a recurrence.

I agree with Dr. New in regard to one of the methods of removal. I should be inclined to practice it if I were removing the epiglottis. That is the transhyoid method. I have been impressed with the excellent view one can secure, on the one hand, and the satisfactory approach so far as removal is concerned, on the other. I have never had an opportunity to practice it.

DR. FRANK ROBERT SPENCER, Boulder, Colo.: I have not had an extensive experience with malignant lesions but I see a few infections of the epiglottis; whether on the laryngeal or the lingual surface, they seem to me to travel down rather rapidly, often on the point where one sees them, by the direct or the indirect method. It is not uncommon to remove an epiglottis and find the tongue or the larynx is badly infected, and you are disappointed by the result.

I hope Dr. Tucker will several years hence tell us the outcomes of these cases, if his results were good, and I believe they will be.

XANTHOMA OF THE LARYNX AND PHARYNX. DR. GORDON B. NEW, Rochester, Minn.

This article will be published in full in a later issue of the ARCHIVES.

A NEW PROCEDURE IN THE TREATMENT OF WEBS IN THE LARYNX, WITH REPORT OF A CASE. DR. SAMUEL IGLAUER, Cincinnati.

Webs in the larynx are of rare occurrence, and may be either congenital or acquired. A review of the literature shows that the usual treatment is unsatisfactory and is often followed by reformation of the web from the adhesions that occur between the raw surfaces.

A woman had had a cicatricial postoperative web between the vocal cords since childhood. The operation was based on the old treatment for syndactylism in which a wire is passed through the proximal portion of the web between the fingers and allowed to remain there until the epithelium grows through from both sides about the wire, thus lining the angle. After this has occurred, the web between the fingers is divided. The epithelium-lined angle is designed to prevent adhesions from forming. Into the larynx, under direct laryngoscopy, I introduced a spring ring through a puncture in the anterior angle of the web, and allowed the ring to remain for about nine days. Laryngoscopy was then repeated and the web removed by sharp dissection on both sides. The after-treatment consisted of intubation with an O'Dwyer tube for about an hour and a half at three or four day intervals.

The final anatomic result was excellent, although some hoarseness still persisted.

DISCUSSION

Dr. Gabriel Tucker, Philadelphia: Dr. Iglauer mentioned a case which I reported. I should like to state the final result in that case. The patient has a perfect voice, is able to sing, and there is complete restoration of both vocal cords. The only difference in the method of treatment was that, as advocated in the previous reports, with repeated incision there was a local application of tincture of benzoin to the cut surface immediately. Apparently it aided in the formation of epithelium and prevented the adhesion of the surface that was cut. This repeated application was carried on, and the patient was under observation for about six months. She was seen once a month during the latter part of the treatment, and at the present time I can report that she has a very good result, an excellent voice. Functionally the result is perfect.

Dr. George W. Fletcher, Winnipeg, Canada: I should like to mention the case of a woman about 32 years of age with a congenital web of the larynx. By splitting the web on one side and allowing a flap to hang, thus not opposing two open surfaces, the result was very good. The patient has a fairly good voice, although a small web remains.

Dr. William B. Chamberlin, Cleveland: In the case of which I wish to speak the web is not between the vocal cords but subglottal. A girl 12 years of age had had a tracheotomy performed at the age of 3 years and had worn the tube for nine years. There was complete stenosis of the trachea between the level of the vocal cords and the tracheotomy wound. I ultimately got through this, and by using a soft rubber tube anchored by a string through the nose, and the lower end through the tracheotomy wound, I got a fairly perfect trachea so that she has a fair voice. On the other hand, I have never been able to allow the tracheotomy wound to close or to close it, although she no longer wears the tube.

For some time I practiced dilatation two or three times a week and had the trachea so patent that I could insert a no. 36 French sound by way of direct laryngoscopy. Subsequently bronchopneumonia developed, and the patient did not appear for some weeks. When she reappeared, the stenosis had reformed, so that on looking in her larynx one saw a subglottis contraction.

I report the case because I want suggestions and help.

Dr. Clerf: I suggest that you do a thyrotomy and dissect out all of the tissue.

Dr. Joseph C. Beck, Chicago: Dr. Chamberlin's case corresponds a great deal with one I had recently. A girl had had diphtheria and had had a tracheotomy. There was a dense fibrous formation in the larynx. Bronze wire was used, and a fairly good result has been obtained.

Dr. John H. Foster, Houston, Texas: In subglottic obstructions decidedly the best results I have been able to obtain were secured with thyrotomy and skin grafts.

Dr. Duncan Campbell Smyth, Boston: I have had two cases similar to Dr. Chamberlin's, that is, one of subglottic closure of the trachea and one of narrowing of the glottis. In those two cases, I split the thyroid cartilage and trachea and took out all the scar tissue possible, and then grafted skin on the interior of the larynx. The results have been fairly good.

Dr. Samuel Iglauer, Cincinnati: In regard to Dr. Tucker's case, at the time he published his article, the case was not complete, and I am glad to hear that he finally got an excellent functional result.

Theoretically it appears to me that the same problem exists when the web is divided along the margin of the cord or in the midline. It seems to me that adhesions will reform.

Dr. Jackson reports some excellent results with this technic: He dilates the larynx daily or every other day to prevent adhesion between the cut surfaces.

Dr. Chamberlin brought up the question of the subglottic stenosis, and I think he has been pretty well answered. The method which he described of putting in a rubber tube I reported some years ago; that is, when there is a tracheotomy, a rubber tube is pulled through the larynx and down into the tracheal cannula and the two brought into place. The use of a soft tube leads to some absorption of the scar tissue, but even with keeping that up for a long time it is very difficult to get rid of the scar tissue.

As has been suggested by some of the other gentlemen, splitting the larynx, removing the scar tissue and implanting skin may eventually give a good result.

Dr. Beck inserts bronze wire instead of the ring. It occurred to me that possibly in a case of this kind one might insert a safety-pin, pull the pin up through the web and close it, leaving it there, and finally get a skin-lined hole, then divide the scar tissue.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Regular Monthly Meeting, April 1, 1935

FRANK J. NOVAK, M.D., *President, in the Chair*

THE DEAFNESS OF BEETHOVEN. DR. IRA FRANK.

Although the deafness of the master musician Beethoven is primarily of interest to lovers of fine music, yet it is appropriate to discuss it with otolaryngologists since there is but little English literature dealing with the subject.

Although there was some familial tuberculosis, there does not appear to have been any history of ear trouble on the maternal or the paternal side. In his early life Beethoven was insufficiently and improperly nourished, and in his early youth he contracted enteritis, and later on icterus, which troubled him till his death at the age of 57 years. The loss of hearing made its first appearance at about the twenty-sixth year. Many of his greatest musical works were composed after he became totally deaf.

The matter of immediate importance to otologists is the cause and nature of Beethoven's deafness. By his many medical advisers and biographers it has been considered as due to different causes. There is no doubt that Beethoven was a constant sufferer from nasopharyngitis, which might have been associated with his ever present enteritis; he may have contracted catarrh of the eustachian tube developing into otitis media, but the history does not entirely bear this out. Others suggest a labyrinthine origin with ankylosis of the stapes; labyrinthitis can have an intestinal focus as its origin. A nervous origin has also been suggested, but, so far as is known, there was no lesion of the internal ear in Beethoven's case, because up to the time of his death he was able to perceive vibrations transmitted through the cranial bones by means of an audiophone. The facts eliminate the hypothesis of cortical trouble; there was no vertigo, no nystagmus, nothing that would support labyrinthine trouble as a direct cause.

Although following his death there was an autopsy on Beethoven, the observations in regard to the ears are unfortunately too vague to be of any practical value. The ear lobes were noted as of abnormal shape, flat and with deformed cartilages.

Dr. Bilancioni has written more extensively than any one else on the subject of Beethoven's deafness and appears to have studied all available material dealing with it. He expresses the opinion that the deafness was due to otosclerosis, that "it was unquestionably a matter of otosclerosis in the sense of a morbid process clinically characterized by a chronic progressive deafness analogous to the deafness produced by chronic hyperplastic catarrhal otitis media."

I think that all the evidence in Beethoven's case appears to favor Bilancioni's opinion and that, in the absence of more decisive proof of any other aural condition, one is forced to agree with it. After full consideration of all the opinions adduced as to other possible causes there is an inclination to view Beethoven's progressive deafness as having been due to otosclerosis. But, as the aural observations at autopsy were inconclusive and the ears, which were for some time preserved in an anatomic museum, have been lost, definite opinions as to the exact cause of the deafness must be conjectural and its real nature remain unsolved.

DISCUSSION

DR. ROBERT SONNENSCHEIN: As stated on a number of occasions, the history of medicine and occurrences in general history or in the history of literature which have a bearing on medicine, and particularly on otolaryngology, have always been of great interest to me. I therefore, greatly enjoyed reading Dr. Frank's paper on the difficulty in hearing which afflicted the great composer Ludvig van Beethoven.

The essayist has noted that although Beethoven was born in Bonn on the Rhine he lived most of his time in Vienna and its environs. Indeed, many can testify to the fact that in Vienna and its vicinity there is a very considerable number of houses to which are affixed tablets stating that from such and such a date to such and such a time the great composer lived there. Beethoven in common with many others not only of that time but even of the present felt that the dampness of the houses was the causative factor in the impairment of his hearing. He therefore moved from home to home hoping to be able to obtain relief.

Although many theories have been expressed regarding the actual pathologic condition present, I believe the facts cited by Dr. Frank permit the definite conclusion that the disease which caused the impairment of hearing was otosclerosis or, as Dr. Shambaugh usually calls it, otospongiosis. Beethoven evidently had very good bone conduction, for it is stated that by means of an "audiophone" attached to his piano he could hear to a considerable degree. Had the condition been that of pure auditory nerve degeneration the bone conduction would, of course, have been exceedingly limited, not sufficient to serve a mechanical device. Furthermore, when a person has a marked degree of impairment of hearing by air conduction but has good bone conduction, in most instances otosclerosis is the condition that is present.

It may be interesting to you to know that in 1770 there was published a translation from the German of a work by Andreas Elias Buechner entitled "An Easy and Very Practical Method to Enable Deaf Persons to Hear." My copy of the little work does not mention the name of the translator. Buechner was a professor of medicine and natural philosophy in the University of Halle in 1744. He was born in 1701 and died in 1769.

Buechner not only emphasized the importance of lip reading as an aid to the deafened, giving credit to Dr. Amman, who first advocated this method, but he mentioned what he considered a new and easy way to aid the deaf. He called attention to the fact that one can hear all the tones of a musical instrument when holding it between the teeth or touching it with a wire or other such instrument held between the teeth. Furthermore, he described the method that was employed at times to utilize the bone conduction during ordinary speech. The patient had his hair combed back and his head shaved for a distance of a handbreadth over the coronal suture. The speaker then directed his voice just over the shaven part, and the deaf person heard distinctly. Of course, one at all times hears some sounds that come via the air through the bones of the skull but does most of one's hearing by way of the external auditory canal. Last, Buechner described utilization of bone conduction by placing thin sticks of wood between the teeth or the edge of a speaking trumpet or other flat objects, thus getting the bone conduction by way of the teeth to the bones of the skull. This, in other words, was the predecessor of the vulcanized rubber fans and other devices used at the present time by persons with marked bone conduction.

Evidently Beethoven used some such method of connecting his body with that of the piano and thus receiving the sounds by bone conduction. The exact nature of the apparatus he used, I do not know. I profited much by Dr. Frank's presentation and hope in the future we shall have other papers of a medical historical character.

Dr. Samuel A. Levinson (by invitation): I came to listen to Dr. Frank's paper and am not prepared to discuss it, but I should like to make one or two notes, perhaps having no bearing on Dr. Frank's paper. I wish to say that Malfati became famous for two reasons: First, he was a student of Dr. Johann Peter Frank, whom Dr. Frank mentioned in his paper, and was responsible for having Wagner come down to Vienna. Malfati took a dislike to Beethoven and when the latter was ill refused to go to him to give him the attendance of medical knowledge. Finally, through the efforts of his friends he consented to go down and he performed about seventeen paracenteses on Beethoven. He was also physician to the son of Napoleon, who was the Duke of Reichstadt. Later in life Malfati was made conscious of the fact that Beethoven was a truly great genius, and he then assumed responsibility for being Beethoven's physician.

Newman in his book stated that Beethoven had syphilis. The autopsy did not corroborate this statement, and I am of the opinion that Beethoven died of hepatic cirrhosis.

It may be of interest to state that Dr. Jaffé is responsible for doing the autopsy on the last of the Beethoven family. It might also be of interest to note that in the development of the Vienna School of Pathology Dr. Jaffé comes down through the school founded by J. P. Frank and Rakitansky. At the beginning of the last war a certain person who was a bank clerk in Vienna died. He was taken to the Algemeines Krankenhause when he first became ill but was later released from that place and taken to the Rudolph Krankenhause in Vienna, where he died, and Dr. Jaffé performed the autopsy without knowing who the dead man was. Later in reading the clinical history he noticed that the dead person was a nephew of Beethoven.

I agree with Dr. Frank that Beethoven's disease was not syphilis but cirrhosis of the liver. I cannot go into the pathologic observations, for Dr. Frank discussed them thoroughly.

Some Immunologic Problems of the Upper Respiratory Tract. Paul R. Cannon (by invitation).

Infection of the upper respiratory tract occurs, presumably, when certain varieties of pathogenic bacteria overcome the natural resistance of the epithelial and subepithelial tissues and grow within them. The extent of such an infection depends on the ability of the invaded tissues to restrict the spread and ultimately to localize the infectious agents. This ability in many instances is lacking and serious disease of the upper respiratory tract occurs. It seems desirable, therefore, to determine in what ways the natural resistance of these tissues may be enhanced in order to make more difficult the entrance and growth of infectious agents.

Immunologic studies within recent years indicate that the local resistance of tissues may be enhanced considerably by measures which insure the mobilization of phagocytic cells, particularly macrophages, in the area of infection. Gay has termed this "enhanced natural resistance," and has suggested that further enhancement may be obtained by the addition of specific immune serum to the region of mobilized cells. The experimental demonstration of the efficacy of such procedure in the pleural and peritoneal cavities and in the skin suggests that a similar effect may be secured by a proper preparation of the tissues of the upper respiratory tract whereby macrophages and specific immune bodies may be mobilized and concentrated in the subepithelial tissues. Such mobilization of macrophages may be obtained in rabbits by local instillation of a bacterial vaccine at daily intervals for a week or more. Walsh and I have presented evidence that under these conditions specific antibody may also be formed or may accumulate in

the nasal tissues, thus providing favorable conditions, theoretically, for the more effective disposal of homologous bacteria which may enter such tissues in a beginning infection.

Little need be said, in view of the rich literature of recent years, concerning the function of macrophages in active inflammation. A mobilization of these cells unquestionably elevates the defensive capacity of an infected area. Clark has shown, however, that any mobilization of macrophages adequate for protection of a rabbit against intrapleural injections of a culture of Streptococcus haemolyticus may be inadequate when a culture of Pneumococcus is similarly injected, but that the mere addition of a small amount of specific immune serum may afford complete protection against the latter micro-organism. It is evident, therefore, that the combined actions of specific immune substances and mobilized macrophages afford the optimal degree of protection against invasive bacteria.

Current ideas of the action of antibacterial antibody regard the primary effect as a surface sensitization of the antigenic particle whereby the deposition on its surface of an antibody protein film makes that particle more cohesive for similarly coated particles or for phagocytic cells. The secondary effect of agglutination or of opsonization and phagocytosis then depends on whether the bacterial particles come in contact with other particles or with phagocytic cells. The antibody effect can be easily demonstrated by the agglutination resuspension method in which a bacterial suspension and its homologous antiserum are mixed and, after a few minutes, the bacterial particles are brought into close contact by centrifugal force. Attempts at complete resuspension by shaking are then unsuccessful because the bacteria adhere to one another as the result of their increased cohesiveness from the deposition on their surfaces of the antibody protein film.

A similar effect can be demonstrated in the living animal. If a culture of Staphylococcus or of Pneumococcus is injected into the skin or peritoneal cavity of an actively or passively immunized animal, the bacteria tend to adhere to one another or to the tissues and to be phagocytosed quickly and effectively by leukocytes or macrophages; thus the free dissemination of the micro-organisms is restricted. The bacteria therefore tend to localize near their point of entrance into the tissue, and the more serious effects of generalized infection are minimized or entirely prevented.

Our recent experiments indicate that the upper respiratory tracts of rabbits can be stimulated by local intranasal immunization with bacterial vaccines so that there is an increased content of macrophages in the submucosa simultaneously with an increased amount of specific immune bodies in the nasal tissues. Rabbits ir munized in this manner with type I pneumococcic vaccine are rendered comp.etely resistant to intranasal infection with a living culture of type I Pneumococcus. Furthermore, the enhanced resistance is predominantly specific, as intranasal vaccination with paratyphoid bacillary vaccine or with type II pneumococcic vaccine or irritation with 0.4 per cent solution of formaldehyde or 1 per cent solution of tannic acid does not significantly enhance resistance against type I Pneumococcus. The exact mechanism of the immunity conferred by intranasal vaccination is still uncertain. Rabbits which have been immunized intranasally for five days with pneumococcic vaccine resist a lethal intranasal infective dose at a time when their blood serum contains negligible or undetectable amounts of protective antibody as shown by mouse protection or complement-fixation tests. Bull and McKee have made the suggestion, also supported in part by our work, that the enhanced resistance is largely local and is due, presumably, to changed conditions of the nasal tissues induced by the local vaccination.

The experimental facts available afford considerable promise for such local immunization of the upper respiratory tract. The procedure is simple and causes little if any reaction in the animals. The objections to the practical application of the method are: (1) the variable degrees of absorption of the antigen through the mucous layer and the nasal epithelium and (2) the difficulty of obtaining representative antigenic types of bacteria in the vaccine in order to engender specific antibodies against the wide variety of bacteria concerned in infection

of the upper respiratory tract. Much more experimental work is necessary before the usefulness of the method can be evaluated.

DISCUSSION

DR. FRANK J. NOVAK JR.: I have not had the advantage of seeing the paper which Dr. Cannon has presented, and the effort to extemporize an opening discussion is not without some difficulties. Dr. Cannon referred to the work of Gay of Columbia and with the modesty of the true scientist has refrained from stressing his own work in this particular field of pathology and immunology. The fact is that Dr. Cannon is one of the outstanding workers in this field. In presenting so much material in a short time Dr. Cannon did not give any definitions. Dr. Cannon referred to macrophages, microphages, mononuclear cells and histiocytes. When reading the literature one runs into a cloud of terms used interchangeably, one author using one term and another something else for the same thing. Macrophages are cells that derive from the undifferentiated mesenchymal tissue. They are large, they have movements of their own, they are primarily fixed cells, but they can detach themselves from their positions and move away. They have a relatively small nucleus and abundant cytoplasm. They have the faculty of taking up animate and inanimate bodies. The microphages have the same faculties. "Macrophage" and "histiocyte" are used interchangeably for cells of the same type. Cells of this type in the liver are referred to as Kupffer's cells, in the omentum as clasmatocytes and in the pulmonary alveolus as dust cells. I think they can all be referred to as microphages or histiocytes, and for purposes of simplification some such classification should be used.

From our standpoint the most interesting part of the discussion is the conception of the cellular defensive mechanism of the mucous membrane. In this field Fenton and Larsell, working together, have shown that there are certain things that may stimulate the action of these cells in the mucosa; these include not only the application of antigens, but mechanical stimulation as by heat or by the injection of inert substances. These things have the faculty of increasing the number of macrophages in the mucosa. I believe that this conception of the resistance of the mucous membrane is of prime importance practically. Ever since time began men have looked for some substance which when brought into contact with tissue would destroy organisms without injuring the tissue. The quest for an ideal antiseptic has been as ardent as it has been futile.

I wish to thank Dr. Cannon for his presentation. I think if one gets away from the idea of depending on antiseptic solutions in infections and thinks immunologically in the effort to control these processes of the upper respiratory tract greater progress will be made.

DR. T. C. GALLOWAY: Can organisms live in the depth of the antral mucosa and thus serve as a focus of infection as Kistner, Potts and others contend on histologic evidence?

DR. ALFRED LEWY: Has Dr. Cannon any data as to how long the relative immunity lasts after it has been established, and also will he tell us a little of the clinical application of his experiments?

DR. H. C. BALLENGER: Has Dr. Cannon done any work with the hemolytic streptococcus?

DR. ROBERT H. GOOD: How long a period after the immunization of the membrane—I think Dr. Cannon said six days—did he wait before he made the solution extract of the membrane? Next, was the nose of the rabbit sprayed or treated with drops of the immunization serum? The question arises with me, if the serum is dropped in, whether it reaches the entire nasal membrane and whether, when live bacteria are dropped in, they may not reach the field that has not been reached by the drops.

DR. T. E. WALSH: We applied the work done in the laboratory clinically. In trying to think up some means of preventing colds we took cultures from

various patients in the clinic and made a vaccine in the same way as in the laboratory. We killed the organisms in solution of formaldehyde, washed them, resuspended them in saline solution, and gave the suspension to the patients to use as a spray in the nose. We told them to use the spray once every day for three weeks and then rest for a week and continue at intervals of two weeks for the season.

The group of patients who came for treatment complained of respiratory infections in the winter, each having from four to six colds lasting from one to three weeks. We gave them the vaccine and observed them every two months during the winter, and had them give us their opinion as to the efficacy of the treatment. Seventy-eight per cent have been free from colds. This is not 100 per cent by any means. We do not know why the treatment was not effective in the others.

One point about the clinical application of vaccine is that there is no ill effect from spraying the nose with the vaccine. We have seen no untoward effect. One has heard of the ill effects of subcutaneous injections of vaccines against colds, and the consensus is that this treatment is not much good. I went through the literature when we began this work, and the general opinion was that it was not very successful. A great number reported swelling of the arm, general malaise and so on, but by the application in the nose we have had none of these bad effects. It can be used in children. They have no objection to having the nose sprayed, and it does not hurt. The patient can use it quite easily at home, and does not have to "lay off" from work to go for "shots."

As to dropping in the nose, I find it practically impossible to spray a rabbit's nose. You can hold them and drop the material into the nose and keep most of it in there, but it is impossible to spray it in. We use a simple medicine dropper, using about 6 drops on each side.

DR. PAUL R. CANNON: I appreciate the discussion and think Dr. Novak expressed the situation very clearly.

I cannot answer Dr. Galloway's question concerning the persistence of streptococci in the submucosa, as I have made no observations along these lines. I assume, however, that in latent infection with streptococci the tissues become almost inert and that as a consequence bacteria may persist for considerable periods of time without leading to much spreading of the infection.

I do not know how bacteria get through the nasal mucous membrane. The recent work on ciliary action and mucous flow, particularly that reported by Hilding, indicates the remarkable efficiency of these agencies as a primary barrier. It has been suggested that bacterial poisons may decrease the viscosity of mucus or decrease ciliary action and thus allow the bacteria to enter the epithelium, where they may actually grow through into the underlying tissues. It is apparent, however, that even dead bacteria or their products get through the epithelium of the respiratory tract, as otherwise it would not be possible to immunize rabbits against Pneumococcus by such a simple device as dropping a vaccine into the nostrils. Some of the organisms may actually get into the lungs inasmuch as Dr. Walsh and I have found that if a solution of trypan blue is instilled into the nose of a normal rabbit the dye may get into the lungs by way of the trachea. Furthermore, recent papers have shown that the instillation of oily "nasal drops" into the upper respiratory tracts of children suffering from acute infection of those passages may be followed by aspiration of the lipoid into the lungs.

We have no data regarding the duration of the immunity of our animals. Dr. Walsh, in giving vaccine to patients intranasally, has the impression that whatever protection may be conferred is of rather short duration, probably only a few weeks. We do not believe, however, that this is so important, as it is a simple procedure to spray the nose and throat at frequent intervals with bacterial vaccine or filtrates.

Our experiments show quite clearly that nonspecific stimulation of the upper respiratory tissues is much inferior to specific. This is in agreement with the experiments of Gay and Clark on experimental empyema of rabbits in which they

found that mobilization of macrophages sufficient to protect against many lethal doses of a culture of Streptococcus haemolyticus was inadequate against Pneumococcus, but that the injection of a small amount of antipneumococcus serum into the pleural cavity containing the mobilized phagocytes conferred complete protection against Pneumococcus.

The principal objections to the practical use of an intranasal vaccine in patients are: (1) the uncertainty that the vaccine will penetrate the mucous barrier and actually get into the tissues and (2) the difficulty of obtaining vaccines which represent the manifold antigenic types of bacteria which may cause upper respiratory infection. Our experiments, however, suggest some favorable prospects in this respect, although they must still be looked on as experimental.

IONIZATION FOR HYPERESTHETIC RHINITIS: A PRELIMINARY REPORT. AUSTIN A. HAYDEN.

Nasal ionization is a matter of physics, chemistry and clinical reactions. Dr. Paul Nicholas Leech, secretary of the Council on Pharmacy and Chemistry and director of the Chemical Laboratory, and Mr. Howard A. Carter, secretary of the Council of Physical Therapy, of the American Medical Association, have kindly consented to present the first two subdivisions of this subject respectively.

MR. HOWARD A. CARTER: I have been asked to discuss briefly the methods of producing an electric current useful for iontophoresis. You will recall from your study of physics that there are four methods of producing an electric current, in other words, an electromotive force. The four methods are: (1) frictional—by rubbing a rod of glass with silk; (2) thermal—by heating a junction of two dissimilar metals, for example, iron and copper; (3) chemical—by immersing two dissimilar metals, for example, zinc and copper, in a weak solution of acid, and (4) mechanical—by cutting a magnetic field with a conductor. The first two, friction and the thermal method, are relatively unimportant. The chemical and mechanical methods are the two most commonly used in iontophoresis.

In the chemical method one may employ a 45 volt "B" radio battery or other suitable battery source. The terminals of the battery are connected to the electrodes through a rheostat or potentiometer for controlling the strength of the current. The first cost of this apparatus is reasonable, but the upkeep is relatively high since one must buy new batteries when they are exhausted.

The current for the ionization under consideration this evening is produced by the mechanical method. As you know, alternating current such as is supplied by the power companies is not suitable for ionization; hence, this electrical energy must be converted into direct current. One way to accomplish that is to connect mechanically a small alternating current motor to a small direct current generator. The leads from the generator are connected to the electrodes through a rheostat or potentiometer. The positive pole of the generator is connected to the anode and the negative pole to the inactive electrode attached to the arm. The first cost of this apparatus is relatively high but the upkeep is low.

The claim has been made that the motor generator set provides a pulsating direct current which is more valuable for iontophoresis than the galvanic current produced by a battery. Further study in this field is required to substantiate this assumption.

DR. PAUL NICHOLAS LEECH: There is always danger in prejudging, whether the subject is chemistry, pharmacology or medical treatment. It is not my purpose tonight to discuss medical treatment. The physical treatment consists of the use of a solution and a galvanic current. The solution contains zinc, tin and cadmium salts. A pledget of cotton is saturated with the solution and inserted in the nose, and then the electric current is applied through an electrode made of the same metals.

If this product were to come before the Council on Pharmacy and Chemistry of the American Medical Association (and it has not) a number of questions would arise. May I present these questions with the view that in time Dr. Hayden and

you who are specialists will be able to tell us whether or not the method merits the clinical confidence of the medical profession?

1. Why are there three escharotic substances in this solution? The council believes in thorough controls. The council would ask that each ingredient be used separately to determine whether or not it is necessary to have such a complicated solution; whether or not the same results could be obtained with a solution of zinc sulphate alone.

2. Is this solution of well known products possessed of sufficient originality to merit the use of a proprietary name? It seems not.

3. Is there any need for the use of an electric current? Could not the same results be obtained by the use of the escharotic substances in sufficient concentration, rather than by applying the escharotic substances by means of a direct electric current? A more concentrated solution would probably give the same results as would a less concentrated solution with the current. Certainly the penetration would be very small, as we look at it, because of the formation of zinc proteinates.

4. If the electric current is needed, is there any need of using a complicated electrode of zinc, tin and cadmium? Would not a cheap ordinary zinc electrode be just as effective?

Another question would be whether or not the penetration would be significant in live tissue.

Still another question which would arise is whether or not after sufficient time there would have been destroyed the normal physiologic functions of the nose. Would not the use of such rigorous escharotic treatment lead ultimately to the formation of stratified squamous epithelial tissue?

These are types of questions that the council would ask. We should desire that the work be done under careful control with a sufficient number of patients. I, for one, am grateful to Dr. Hayden and others who are willing to undertake experimental work with a view to determining the value of the method.

DR. AUSTIN HAYDEN: This is a preliminary report. The clinical material consists of five patients with hyperesthetic rhinitis of the perennial type. They range in years from 23 to 59. The symptoms they complained of were headache, nasal obstruction, wheezing chest, sneezing, anosmia, swelling of the eyes and feet and neuritis. Five have been free from these symptoms since being treated by ionization. The technic used was that recommended by Warwick.

Anesthesia.—A solution of equal parts of 5 per cent cocaine and 2 per cent ephedrine on cotton pledgets packed into each side of the nose along the floor and under the inferior turbinate, against the septum, around the middle turbinate and against the outer nasal wall for ten minutes suffices for complete anesthesia.

The nose is carefully packed with thin cotton strips soaked with the electrolytic solution of zinc, antimony and tin which Dr. Leech described, so that the entire nasal mucosa is in contact with the solution as nearly as this is possible. The lower floor is usually packed first and the small cotton pledget is carried underneath the inferior turbinate. The electrode is then introduced and buried by packing two more strips of the cotton along the septum, up around the middle and down over the inferior turbinate. The skin of the nasal orifice is separated from the electrode by a thick layer of the packing. The cotton is kept thoroughly saturated while the nose is being packed. With this complete packing—and unless it is thorough the result is very apt to be disappointing—the current is applied from the machine the details of which have been described by Mr. Carter, for ten minutes. The electrode is then removed followed by the cotton strips, which have now become quite dry. The mucosa is covered with a thin light yellow filament. It looks dry, but within two or three minutes swelling and moisture appear. In five minutes the blocking is complete, and the nose is very wet. The same routine is repeated on the opposite side. This swelling lasts for five or six days. The patient is warned not to attempt to remove the crust by picking or any other manipulation and not to try to breathe through the nose. Wet packs over the nose and eyes will be gratefully accepted. Menthol in liquid petrolatum

(1 grain [0.064 Gm.] in 1 ounce [31.1 Gm.]) dropped into the nose at hourly intervals seems to relieve the sense of congestion. Although both sides of the nose are absolutely shut the patient complains little of discomfort, probably owing to the fact that he has become accustomed to nasal obstruction during the course of his disability.

Those who have had more experience with this than I have say that the most favorable time to treat hay fever, for example, is at the height of the attack. About the fifth day the crust begins to come out. The swelling recedes rapidly. By the seventh to the ninth day the nose is open and nasal breathing is completely restored. The mucosa seems normal; no synechiae have been observed.

We believe from the symptoms that the improvement has been striking in the two cases I presented tonight. I cannot follow the physics Mr. Carter showed, nor can I follow the chemistry of Dr. Leech, but the thing works without doing harm to the patient, and in these few cases it has worked well. I present it to the society tonight because I think the members should know about it. It is apparently a very satisfactory means of treating hyperesthetic patients whether their condition is seasonal or perennial. I think it is an addition to the rhinologist's armamentarium, and I invite you to try it without producing any further evidence than that I have produced.

Case Histories.—Miss D., aged 23, complained of excessive posterior pharyngeal discharge for three years, some headache, some pain in the arm and shoulder, nasal obstruction so bad that it kept her awake at night and sensitivity to cold. Since the treatment by ionization all symptoms have disappeared, and she is now able to sleep through the night very well.

Sister V., aged 41, complained of severe headache for several years, which was very bad during the past three months, and of nasal obstruction (almost complete on the right side), much sneezing, some nasal discharge, severe pain in the arms and shoulders, swelling around the right eye, sensitiveness to cold, swelling of the right hand and elbow and pain in the teeth in cold air. Since she was treated by ionization she has had no headache, sneezing or nasal discharge; swelling around the eye and that of the knuckles have disappeared; breathing is much improved, and she is not sensitive to cold.

Mrs. C., aged 59, complained of severe headache, nasal obstruction (especially at night), excessive nasal and postpharyngeal discharge (she had to use daily six or seven handkerchiefs of the type used by men), sensitiveness to cold (a draft brought on sneezing), impairment of the sense of smell, swelling across the eyes and forehead, wheezing in the chest, profuse watering of the eyes during sneezing, swelling of the hands, pain in the right shoulder and arm and head colds. She always had to use ephedrine to help breathing. Since her treatment by ionization she has been symptom-free.

Miss B., aged 17, complained of almost complete nasal obstruction, excessive sneezing and considerable nasal secretion (she had to use from eight to ten handkerchiefs daily); her nasal discharge was always worse at night (she had to get up during the night to expectorate); her hay fever (August) was very bad last year (she had to sit up at night); there was some asthma with the hay fever; she had some respiratory difficulty after walking up one flight of stairs; there was persistent itching of the roof of the mouth. Since her treatment by ionization her breathing has been very good; she has had no nasal secretion, and the itching of the roof of the mouth has disappeared.

Mrs. K., aged 48, complained of asthma and obstructed breathing. Submucous resection gave her some relief but not much. She required from six to eight injections of epinephrine daily for relief from asthmatic attacks. Since her treatment by ionization no epinephrine has been required, and breathing has improved somewhat.

DISCUSSION

DR. A. R. HOLLENDER: I have been using intranasal ionization the past twelve years chiefly for simple chronic rhinitis and for persistent maxillary sinusitis

after window resection. During several years I have performed ionization also for allergic nasal disease, both the perennial and the seasonal type. To understand ionization one must know what the procedure involves. Although many definitions have been given ionization is now regarded as an electrical osmosis of drugs or chemicals within the tissues of the body. In carrying out the method use is made of the galvanic current which is a direct, or constant, current, as Mr. Carter has illustrated, and there are several sources from which it can be derived. It has definite chemical properties, and it may be applied for medical or surgical purposes. In otorhinolaryngology the galvanic current serves for electrolysis and for ionization, the former being classified as a surgical and the latter as a medical procedure. In the strict sense, however, ionization is more than a medical process, but with it no gross destruction of tissue takes place. Ionization produces definite effects on the nasal mucosa, but this phase of the subject is too large to consider at this time.

The technic of intranasal ionization has been described by various workers. Some have led otolaryngologists to believe that it is a complicated procedure which entails hospitalization and elaborate equipment. With the technic which I employ this is not the case. My technic requires a smooth galvanic current and a weak solution of zinc sulphate (up to 1 per cent in strength). The packing consists of long gauze strips which are thoroughly moistened with this solution, or so-called electrolyte. The strength of current and the duration of flow vary with the individual case but in general from 100 to 150 milliampere-minutes is administered.

The question whether there is any special advantage in combining escharotic solutions for the electrolyte is a matter which is not definitely settled. In my opinion, based on an experience of considerably more than a thousand treatments by ionization, the simple zinc sulphate solution answers the same purpose as any other electrolyte. Whether the solution in itself without the current will prove effective is something that requires more intensive investigation. I have convinced myself by control studies that a solution of the same strength as the electrolyte without the application of the galvanic current is ineffective in relieving the symptoms of allergic coryza. That stronger escharotic solutions in themselves might act favorably is a problem which I shall thoroughly investigate in the near future.

I have not yet reached the point where I consider ionization as a "cure" for hyperesthetic rhinitis. I am thoroughly convinced, however, that it is a palliative which is capable of producing prolonged relief in the large majority of indicated cases. In the absence of a specific remedy and because of persistent failures with specific immunization, one's patients are entitled to the most effective palliative measure at one's disposal, and this is ionization.

Dr. E. P. Norcross: Those of you who have been members of this society as long as I will recall that during the past years there have been many discussions here concerning what were then called new methods of treatment. Most of these methods have long been forgotten. Now the so-called Warwick treatment, or treatment of the nasal mucous membrane for hay fever and hyperesthetic rhinitis by ionization, is on trial. At present, reports concerning this treatment are very favorable. Dr. Warwick has reported repeated successes over a number of years. However, most reports from other men cover only one hay fever season. One must wait another year or two before one can draw final conclusions.

So far I have treated twelve patients with hay fever and two with hyperesthetic rhinitis. Two of the patients with hay fever did not notice any improvement; the remaining ten were all benefited in varying degrees; some stated that they had had no hay fever during the season; others, that while they had had some symptoms these had been mild. Of the two patients with hyperesthetic rhinitis one was practically cured, and the other had been free from symptoms for a week when, following a severe head cold, the symptoms returned. As she lives at a distant point I have not heard what the final results are.

It has been stated here tonight that there is nothing new in this treatment, yet so far as I know such treatment has been used only by those men who are

more or less ingenious in the use of electrical apparatus and have devised their own machines. Now for the first time the method has been standardized so that any one who can pack a nose may give the treatment. My results last year with a few patients are so encouraging that I am going to use the treatment this year. Most of my patients were treated before the hay fever season, but it now seems that best results are obtained by giving the treatment at the beginning of the season when symptoms are present.

Dr. T. C. Galloway: I think it is well agreed that there are certain factors that are necessary for the production of hyperesthetic rhinitis. One is an intact reflex arc. Probably the interruption of that arc by the method of Dr. Otto Stein, who used injections of alcohol, was responsible for the effect that he obtained. Certain operative procedures may work in the same way. Another factor is the blood supply, and diminishing it as in Dr. Beck's submucous coagulation of the turbinate gives good results in some cases. I think all agree that certain underlying constitutional factors are necessary. In some patients hypocalcemia exists; some can be helped by administering thyroid or parathyroid extracts. And then, in nasal allergy, as Sewall showed in the work on guinea-pigs, absorption through the mucosa is important. Is this treatment anything more than an interference with the normal mechanism of the nose so that it no longer absorbs allergens or the less specific irritating substances? It may be that it is all right to carry the chemical reaction to that point, but one has been hearing much about the necessity of having a normal nasal mucosa for the normal function of the upper respiratory tract, and this is surely a considerable insult to delicate tissue.

Dr. Noah Schoolman: This evening we heard from Professor Cannon about the biologic approach to increasing resistance in the mucous membrane of the nose, and Dr. Hayden has continued with the chemical approach to increasing resistance or correcting some pathologic effect in the mucous membrane of the nose. I think it would complete the handling of the subject if the physical effect of astringents applied to the nasal mucous membrane should be emphasized. There is considerable recent literature on the subject. I became interested a number of years ago in the use of boric acid by snuffing it up through the nose with the idea of increasing local resistance; I find empirically that at the beginning of a cold snuffing boric acid up the nose helps. I have also tried boric acid for chronic otitis media with recurrence of sinus infections, and have advised the use of it as snuff and also for filling up the canal of the ear with the idea of preventing reinfection during the bathing season, with good results. It is very possible that zinc sulphate acts as a physical astringent in a similar manner as boric acid, tannic acid, aluminum acetate, silver nitrate, etc., and that ionization merely enhances the astringent effect.

Dr. Ralph P. Sproule, Milwaukee: I have used this treatment in fifteen cases. As I recall, in seven there were good results, in four the results were encouraging, and in the other four there were no results.

I am not speaking for or against this apparatus. The manufacturer asked me to try it and while I do not believe in experimenting on private patients I did try this method. Three months later I reexamined the patients during the hay fever season when the air was dry and did not find any unusual crusting in the nose. I think this demonstrates that the reaction in these cases was not severe enough to destroy the cilia of the mucous membrane. This fact was further proved microscopically by Dr. Arthur Alden of St. Louis.

I think I shall wait another year before purchasing the apparatus.

Dr. Joseph C. Beck: As in all types of disease in which one does not know the cause but simply knows the pathologic changes one gropes around for some method of treatment. As Dr. Norcross said, that has been the experience in this society since I have been a member of it. The members have seen many things come and go. Several months ago I was embarrassed when Dr. Thomas Halsted of Syracuse wrote and inquired what my experience had been with this treatment. I told him that I had had no experience. He was quite put out about

it and said he was told to "write Joe Beck because he tries everything." I have not tried this treatment. Every man who treats hyperesthetic rhinitis, and there is no condition more difficult to manage than that of these water-logged noses, has seen it treated by many different methods. One has seen the effects on the mucosa, such as sloughs from carbolic acid, trichloracetic acid and what not. The fact remains that one should be loath to condemn any treatment that may give relief to a patient. Whether it is necessary to use all these substances or not I do not know, but I think probably the zinc sulphate is the best to use. I think we should continue to try to find out the facts. Just like Sproule, all the boys who have had their training with me know that I used to buy everything that came along, but I have learned not to do this of late. I am looking to Hollender to give us the ultimate findings in these cases, not the early changes. The ultimate result on the nasal mucosa, which is so much insulted all the time, is what one wants to know more about.

Dr. Francis L. Lederer: The discussions this evening have brought out conclusively that the method of ionization may be greatly simplified both in technic and in materials. Dr. Hollender's attitude in calling the method "a prolonged palliative" is brought about by his long association with physiotherapeutic methods. His pioneering efforts were accompanied by nothing but rebukes. Today he need make no apologies for physiotherapy, because the field has demonstrated its usefulness.

As with other modalities one must guard against overenthusiasm. This method has been used for many years, and suddenly it springs into prominence. Care must be exercised in its general acceptance until proof of its nondestructiveness is presented. I am so often impressed by the effect of various treatments on so-called hyperesthetic rhinitis that I cannot help but feel that the psychogenic factor cannot be minimized.

My great objection is to the present interpretation of the results on a quantitative basis. While a few personal testimonials of patients cannot help but arouse one's enthusiasm, the method is very unscientific. Sporadic reports of uncontrolled results in a few cases here and there can mean little. My personal feeling has been ably expressed by Dr. Hollender: As long as the etiology is in doubt and the treatment so inadequate any method that promises palliation such as zinc ionization has shown is worth while as long as it can be proved to be physiologically compatible.

Dr. Paul Nicholas Leech: I appreciate having had this opportunity to listen to the opinions of clinicians, whose evidence one respects because the bedside evidence is the crucial evidence. I was particularly interested in Dr. Hollender's statement of his method of approach. The common factor in this whole method is the zinc ion. If you place a piece of cotton saturated with zinc sulphate in contact with the mucosa you may obtain a relatively high concentration of zinc ions at the juncture by two methods: 1. With a weak solution of zinc sulphate you may employ an electric current to push the zinc ions over to the mucous membranes in relatively high concentration. 2. You may use a strong concentration of the solution and thereby have approximately the same concentration of zinc ions at the point of contact with the mucosa. This is what I meant by using controlled solutions, not solutions of the same strength of zinc sulphate but solutions yielding the same concentration of zinc ions at the point of juncture.

One other factor: During the war there was poisoning from cadmium in foodstuffs. I do not expect there will be much poisoning from the use of cadmium salt during the application of iontophoresis, but if some were to be swallowed, I should be a little fearful that cadmium poisoning would result. I have had occasion recently to look up the literature on cadmium compounds, and there is real opportunity for poisoning.

Dr. Austin A. Hayden: I hope you will be impressed with the care the American Medical Association uses before it gives its approval to instruments and drugs by the appearance here tonight of Mr. Carter and Dr. Leech.

Dr. Sproule just told me, and the literature I have had at my disposal indicates without question that the period when the treatment can be given best is when there is considerable difficulty in the nose, whether the patient has hyperesthetic rhinitis or hay fever.

I think a second thing that is important is that the nose should be free from any considerable destruction—for instance, polyps, pus in the sinuses, enlarged turbinates or deflected septums.

The time that has elapsed since the treatments I have given is very short, but the nasal passages look absolutely normal and there is an absence of crusting. The young woman who was presented this evening had not been able to exercise the sense of smell for several years, but that has returned to her since the treatment was given. There was one very striking case. The last patient, a woman aged 48, was suffering so from bronchial asthma that she was taking from six to eight doses of ephedrine every day. Since this treatment she has not felt the need of taking any epinephrine.

I do not know what the scar tissue will mean in after years. I think it is very difficult to prognosticate as to that, for many of these people will have hypertrophic rhinitis in the course of events. Whether this should be charged up to the ionization or not I think no one knows. Only a few weeks are necessary to tell whether any adhesions have resulted from the scorching of the mucous membrane.

I hope you will try this method of treatment, for I believe it offers a very good possibility of giving relief to the millions of people in the United States who suffer from this condition.

Book Reviews

Chronic Nasal Sinusitis and Its Relation to Mental Disorder. By F. A. Pickworth, M.B., B.S., M.R.C.S., L.R.C.P. Price, 16 shillings net. Pp. 156, with 83 illustration. London: H. K. Lewis & Co., Ltd., 1935.

The material forming the basis of this monograph consists of the observations at autopsy on 471 patients dying in institutions for mental disease. Of these, according to Pickworth, 314, or 66 per cent, presented evidence of some inflammatory disease, active, healed or latent, of one or more of the nasal sinuses. It is his contention that this association is more than fortuitous, and the inference is made that in each of these cases the sinus involvement stands in direct causal relationship to the mental disorder. A great deal of heterogeneous data, some factual but much pure assumption, are brought together to support this thesis. On the whole, the work is uncritical to the point of being naïve.

In the first place, the incidence of sinus disease in insanity as found by this author is much higher than that generally quoted elsewhere. It is the sphenoid sinus which is most emphasized. While a suppurative process is described in some cases, the author states that the "catarrhal" type of chronic sinusitis with mucosal thickening is the form most often met with in patients with mental disease, and one wonders whether this investigator does not often read too much into insignificant findings. Great stress is laid on the demonstration of the presence of organisms, chiefly streptococci, within the sinus membranes, the adjacent bone, the perivascular regions within the brain and even the pituitary gland. No account is taken of the age or condition of the autopsy material, but it would seem most likely that these findings represent merely postmortem invasion of the structures in question, particularly since no inflammatory cellular reaction can be seen in the examples which are figured.

From the neurologic side, the changes considered, both clinical and pathologic, are even more diversified and disconnected. Slight meningeal fibrosis, commonly seen in normal brains; small perivascular hemorrhages, many of them probably agonal; atheromatous degeneration of the carotid arteries; small ischemic foci of degeneration in the cerebral cortex; engorgement of cerebral capillaries and small vessels; small areas of softening—all these and more are sweepingly assumed to account for the insanity on the one hand and to depend on nasal sepsis on the other. Insanity itself is treated as though it were an entity. Cases of senile and arteriosclerotic dementia, epileptic psychoses and acute and chronic states of dementia praecox are placed on the same etiologic footing. This unification is justified by the assumption that in all mental disease there is a uniform lesion, and that this lesion is a vascular change or a vascular disturbance. Often, Pickworth states, this is indicated only by localized anemia or hyperemia or by fine capillary hemorrhages. But every pathologist knows that the degree of filling of cerebral blood vessels in ordinary postmortem material is extremely variable and can scarcely be used as an anatomic correlate of any type of disturbed function.

It is to be hoped that these loosely reasoned doctrines do not gain sufficient credence to be provocative of indiscriminate surgical treatment of the nasal sinuses in mental disease of every kind and description.

Réactions labyrinthiques et équilibre. By G. G. J. Rademaker, Professor at the University of Leyden. Preface by Prof. G. Gillain. Price, 80 francs. Pp. 262, with 124 illustrations. Paris: Masson & Cie., 1935.

Rademaker, whose studies of the cerebellum, the red nucleus and the labyrinth have long made him a well known figure among neurologists, contributes an extremely interesting and well written work on the subject of equilibrium. The greater part of the book is given over to an analysis of labyrinthine reactions as

manifested by the position of the extremities under various conditions. He omits the caloric reaction, since it is not a normal physiologic stimulus, and confines his studies to the reactions following turning or falling. These are divided into three groups: (1) the reactions induced by vertical rectilinear movements, (2) reactions from rotation and (3) reactions resulting from movements with relation to the force of gravity. All these reactions are studied under the following contrasting circumstances: (1) in normal animals, (2) in normal human beings, (3) in decorticated animals, (4) in animals with one or both labyrinths removed, (5) in human beings with labyrinthine lesions, (6) in human beings with cerebellar lesions and (7) in persons with tabes.

The various maneuvers are graphically illustrated by columns of moving pictures which demonstrate the changing position of the body and limbs. Each group of pictures carries its own explanatory line which makes the work easily read and understood. Rademaker seeks to demonstrate exactly how the labyrinth accomplishes the maintenance of equilibrium and in what manner its reactions influence body posture. He points out that heretofore attention has been directed mostly to compensatory ocular movements of labyrinthine origin or to the tonic labyrinthine reflexes as demonstrated by Magnus and De Kleyn, while little has been done to clarify the subject of equilibrium or to show the rôle of the labyrinth in this function. He is concerned entirely with objective findings and omits a consideration of subjective or sensory impressions.

The function of the cerebellum and its relationship to labyrinthine function are carefully treated and their reciprocal relationship appraised. The author's thesis is based on the assumption that the labyrinth is a sensory organ through which certain reactions are evoked, whereas the cerebellum acts as a regulator of motor activity. He seems to attribute greater importance to the former than to the latter and shows that while on the one hand the absence of a labyrinth and cerebellum on one side does not diminish tonus of body support as a whole, a bilateral labyrinthectomy in an animal half of the cerebellum of which has been removed increases enormously the resulting ataxia.

A thorough bibliography adds much to the value of the book.

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Secretary: Prof. Dr. C. E. Benjamins, Verlengde Heerweg, 143 Groningen, The Netherlands.

NATIONAL

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Chairman: Dr. Ralph A. Fenton, 1020 S. W. Taylor St., Portland, Ore.
Secretary: Dr. Gordon B. New, Mayo Clinic, Rochester, Minn.
Place: Kansas City, Mo. Time: May 11-15, 1936.

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* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.